FLIGHT
and
AIRCRAFT ENGINEER

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The Outlook

Britain's Fighters

THE Gloster Meteor came into service with the R.A.F. during the war, to be followed late in 1945 by the de Havilland Vampire. So last week's statement by the Joint Parliamentary Secretary to the Ministry of Supply that, if there was another war, he had no doubt that a large number of Spitfires would be used, may have come as a surprise to a number of people by whom previous allusions to Britain's "all-jet" fighter force may have been interpreted too literally. The fact is that, although Meteors and Vampires have displaced Spitfires throughout the Command, a number of fighter units overseas, and the majority of Auxiliary squadrons in this country, are still armed with the evergreen "Spit." Doubtless Mr. Freeman also had in mind, when he referred to Spitfires, the D.H. Hornet long-range fighters and night-fighter Mosquitoes which will likewise continue to serve.

The Parliamentary Under-Secretary went further, however, adding that if the war was "a bit further off," aircraft with Nene and Derwent turbojets would be used. This statement must not be interpreted as excluding the D.H. Goblin turbojet, now giving exemplary service in the Vampire at home and abroad, nor, indeed, the larger and later Ghost, or the pure-jet units under development by Metro-Vickers.

Had Mr. Freeman pursued his theme, he might have explained that for a considerable time to come, the Vampire and Meteor will be the standard R.A.F. fighters, adding that (as pointed out in the first part of a lengthy survey published in this issue) the innate versatility and adaptability of these designs will further extend their usefulness and protract their length of life. Already, the Vampire has appeared as a ground-attack fighter, carrying a quite remarkable load of R.P.s and bombs, with, as observed in our report on a recent air weapons demonstration, little apparent effect on its rate of climb.

There is, however, a danger that the excellence of the Meteor and Vampire may cause too much reliance to be placed on these types for the more distant future, and the sooner the existence of prototypes by the same, and other, manufacturers is made known, the sooner will the country be reassured that full benefit is being derived from Britain's unique operational experience with jet fighters. Even the highly promising Hawker N.7/46 and P.1040 and the Supermarine Attacker, together with possible "swept-back" developments, will not suffice unless they are to be supplemented in time by more specialized night-and-all-weather fighters and, possibly, by other classes of fighters to which the article in this issue refers.

Functional Overlapping

SHORTLY the reports of the three Airways Corporations will be issued, and it is a foregone conclusion that they will show heavy losses. Presumably some official statements will also be made as to what it is intended to do in order to minimize losses in the future and to ensure more efficient operation.

Last July, when the announcement was made of the decision to buy Canadian DC-4-Ms, the chief executive of B.O.A.C. outlined the plans for reorganization in that Corporation, partly as regards the different departments and partly the position in the matter of aircraft types and routes.

Since that time, several appointments have been made of important people to high positions. And now comes the announcement of the nomination of two officers from the Ministry of Civil Aviation "to be associated with B.O.A.C. and B.E.A. respectively in the overhaul of their organization which each of the Corporations is undertaking." The announcement points out that "This step has been taken in agreement with the Corporations in the exercise of the Minister's ultimate

responsibility for the whole field of civil aviation and with the object of avoiding functional overlapping between M.C.A. and the Corporations."

Two recollections come to mind in this connection. One is the remark of B.O.A.C.'s chief executive, after the DC-4-M decision, that now they knew how they stood and could get on with their work "without having to look over their shoulders." The other recollection is of Government spokesmen, Ministers and others, stressing the fact that the Corporations must have complete independence in the details of their work, the Minister of Civil Aviation formulating the general outline of policy. These appointments do not appear to be quite on all fours with previous utterances, and the disquieting thing is the feeling of uncertainty and lack of continuity being engendered.

In view of the fact that while the Corporations have been contracting, the Ministry of Civil Aviation has been expanding, adding to its departments and staffs, the conclusion appears unescapable that if there is overlapping, it must be caused by the Ministry rather than by the Corporations. The latter are the potential money earners, while the functions of the Ministry are purely governing. It has been a not uncommon complaint that there are people in high offices doing similar work to that being done in certain branches of the Ministry of Supply and in the Corporations.

Perhaps the solution lies in the direction outlined by Viscount Samuel last July in the House of Lords, when he expressed the view that the time had come for an independent fundamental enquiry into "the right form of ministerial and commercial organization of civil aviation." Something more is obviously needed than the appointment of a couple of M.C.A. officers to avoid functional overlapping, and when Parliament comes to discuss the Corporations' reports, this subject may be raised again.

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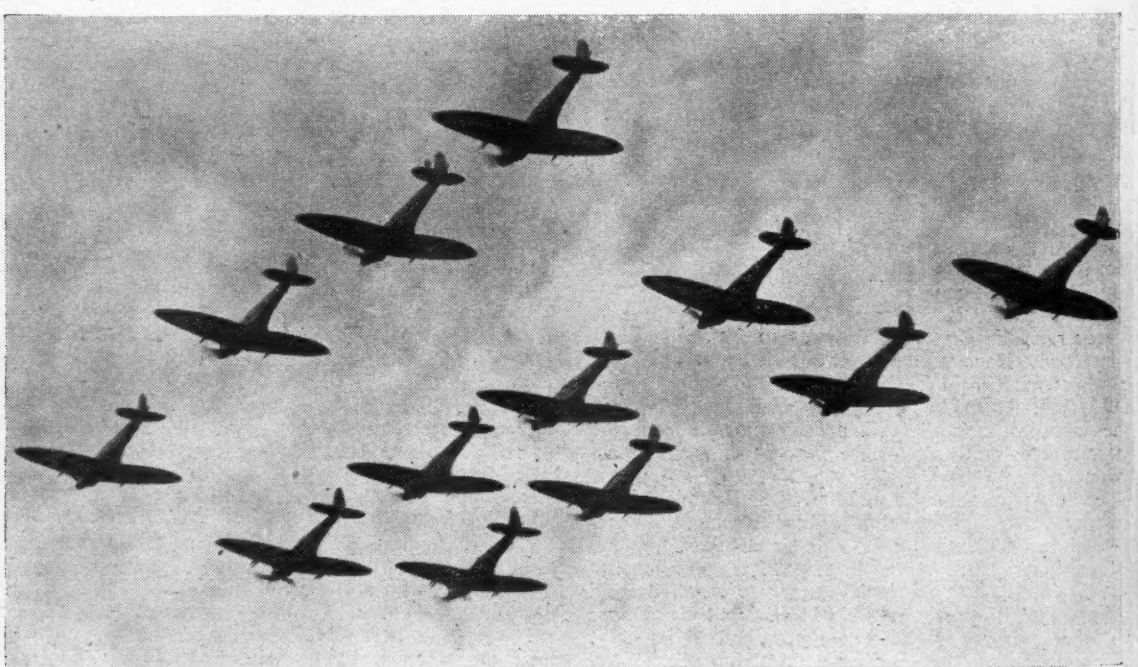
Carriers

THE report, subsequently denied, that the Admiralty had cancelled contracts for three light carriers, serves as a reminder of the entirely new problems which the adoption of jet-propelled aircraft has posed. In this instance, the explanation given is that work on these carriers was suspended, and that in the meantime the contract time limit has expired.

It may be assumed that the Admiralty is taking the opportunity to formulate new requirements and features to be incorporated in carriers of the latest type. The launching of jet-propelled aircraft, and more specifically a satisfactory rate of launch from a carrier deck, presents many difficulties. The jet efflux makes a close line-up impracticable, and many other considerations enter into the problem. In fact, it may well be that the aircraft carrier of the future will be very different in many respects from the carrier of to-day.



"Flight" photograph.

THE UNSEEN FORMATION: Although bad weather prevented the fly-past over the King's review of Territorial units in Hyde Park on Sunday last, the R.N.V.R. squadrons Nos. 1831, 1832 and 1833 took off in their Seafires from Culham, Oxfordshire, and flew in formation over the local countryside.

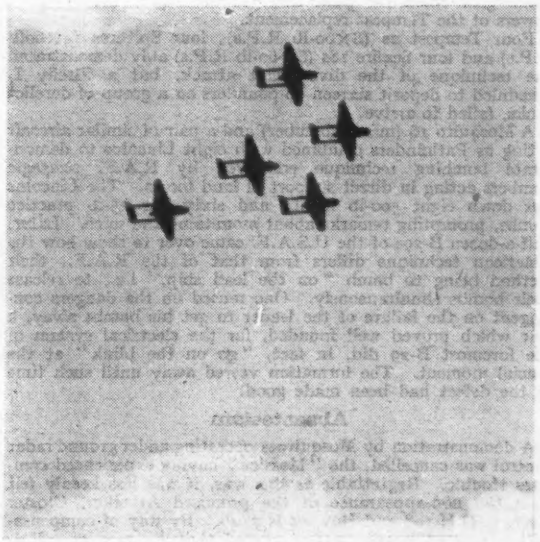
AIR SUPPORT

A Hastings from the A.F.E.E., Beaulieu, drops 24 paratroops from its double doors. This method is likely to be cleared for Service use in the near future.

Special Senior Course at S.L.A.W. Show New Equipment

Illustrated with "Flight" Photographs

AS an Air Ministry coach toiled tardily up the track leading to Westdown ranges last Tuesday week, its occupants—the writer included—were chagrined to observe that the air weapons demonstration for the 6th Special Senior Course of the School of Land/Air Warfare was already in progress. R.A.F. Tempest 2s and Meteor 4s, and F-80 Shooting Stars of the U.S.A.F. nosed down successively towards ground targets screened by a ridge. Smoke streamed from their gun ports as they opened up with 20 mm Hispanos and "fifty-calibre" Brownings before disappearing below the skyline, seemingly to burrow a lengthy subterranean passage before zooming steeply into view a mile or two across country. On arriving at length in the observation enclosure, it was learnt that the shooting had generally been very accurate and that the F-80s, with their six 0.5-in nose-mounted guns, had made especially good practice.



As usual, the Vampire aerobatic team from Odiham drew approbation from the most blasé observers.

The litter on a Sikorsky Hoverfly used by the Transport Command Development Unit, Brize Norton, for experiments in casualty evacuation.

We must assure our American friends that this scant record of their first post-war armament demonstration in Great Britain implies no lack of interest or courtesy on our part; it is the result of a hitch in the official organization.

The strafing with cannon and heavy machine guns had been followed by skip-bombing by two Tempest 2s, each using a pair of inert bombs. Unfortunately, a view of this event and of the ensuing tactical dive-bombing by four Tempests had also been denied us, but we were in time to see three Spitfires from the Central Gunnery School place their 250-lb instantaneously fused bombs squarely among the derelict airframes which represented their target. An agreeable surprise was the arrival from Boscombe Down of a new de Havilland Vampire 5, fully armed with two 500-lb bombs and eight R.P.s, the disposition of which was described in the preceding issue of *Flight*. The pilot brought the compact fighter-bomber past the distinguished "students" at very low level before pulling up in a zoom to some 6,000ft, the Vampire evidently being little

(Left) the lone aerobatic F-80 Shooting Star over Westdown ranges. (Right) the Universal freight container dropped by a Halifax 1,500ft over Netheravon.

Air Support . . . . .

handicapped by the drag and weight of its external stores. Regrettably, the demonstration was marred by a failure of the bomb gear when the pilot came in to display the offensive powers of the Tempest replacement.

Four Tempest 2s (8×60-lb R.P.s), four Spitfires (4×60lb R.P.s) and four Seafire 18s (8×60-lb R.P.s) ably demonstrated the technique of the dive-rocket attack, but a Firefly I, scheduled to deposit sixteen 60-pounders on a group of derelict tanks, failed to arrive.

A Mosquito 16 (master bomber) and a pair of similar aircraft acting as Pathfinders combined with eight Lincolns to demonstrate bombing technique employed by R.A.F. strategic bombers acting in direct support of land forces. The Lincolns put down eight 500-lb bombs and sixty-four 25-lb practice bombs, prompting remarks about mountains and mice. Later, half-a-dozen B-29s of the U.S.A.F. came over to show how the American technique differs from that of the R.A.F., their method being to bomb "on the lead ship," i.e., to release their bombs simultaneously. One mused on the dangers contingent on the failure of the leader to get his bombs away, a fear which proved well founded, for the electrical system of the foremost B-29 did, in fact, "go on the blink" at the crucial moment. The formation veered away until such time as the defect had been made good.

Absenteeism

A demonstration by Mosquitoes operating under ground radar control was cancelled, the "Mossies" having experienced compass trouble. Regrettable as this was, if was less keenly felt than the non-appearance of the promised Attacker, Gloster E.1/44, D.H.108 and Hawker N.7/46. By way of compensation a single Shooting Star, showed that its rate of roll is exceptionally high and that its rate of climb, though inferior to that of the Meteor, is to be respected.

For sheer spectacle, however, the five "transatlantic" Vampires from Odiham were unrivalled. Especially captivating was one of the items in which only four of the aircraft participated—a formation change from line astern to vic during a loop. The "individualist' charged with holding attention while the formation is positioning itself for the next manœuvre, lived up to his name. He was especially fond of scampering over the grassy hills like a rabbit.

On October 27th, at Netheravon, No. 38 Group put on a first-rate demonstration of transport support. A Valetta from the A.F.E.E., Beaulieu, dropped five dummy parachutists from 700ft, and two Dakotas from the Transport Support Training Unit, Netheravon, each put down a stick of twenty paratroops from the 66th Anti-Tank Regiment. From a Halifax of the T.C.D.U., Brize Norton, twelve paratroops of the R.A.F. Regiment made a smart exit and were soon in action. A novel event was the dropping of twenty-four paratroops from the twin doors of one of the new Hastings, but that the older Halifax is still capable of doing a very useful job was further illustrated when one of these machines delivered by parachute a jeep and a six-pounder gun, together with crew of six. Dakotas from Netheravon, a Halifax from Brize Norton, and a Hastings from Beaulieu released panniers and containers from low level, and two Tempests from B.A.F.O. each contributed two 350-lb containers. A Firefly similarly demonstrated low dropping.

Particularly impressive was the arrival out of the mist of a Hastings/Hamilcar combination, and the subsequent landing of the great glider, which in due time disgorged a D.4 bulldozer. Comparison was afforded by the lighter Valetta/Horsa combination, the Horsa likewise landing to unload a jeep, 75-mm. gun and trailer. A third combination demonstrated was a Dakota/Hadrian. Having unloaded a motor team of the R.A.F. Regiment, the glider was "snatched" by a Dakota, the pilot of which displayed superb judgment.

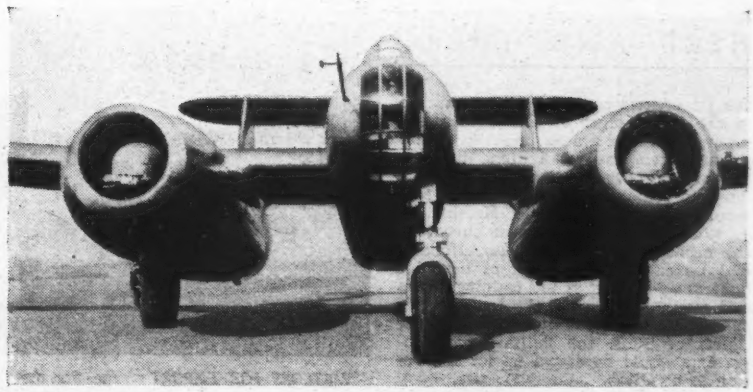
A Hoverfly helicopter from Brize Norton had been fitted with a litter to show how casualties might be evacuated by such aircraft. Plastic "blisters" may in future be used to protect the patients, up to three of whom may be carried. The parachuting of ordnance stores from 500ft and free dropping from 150ft was illustrated by Dakotas, and a lull in the flying programme afforded an opportunity for the officers of the Special Senior Course to inspect troops and equipment.

Six containers with delayed-action parachutes were to have been released from a Lancaster from Farnborough, flying at 3,000ft, but the Lancaster passed over and disappeared with its load still aboard. Farnborough did, however, supply a Halifax, which released the massive Universal freight container, lowered by six 42-ft parachutes. Three air bags take landing shock.

While members of the Course were examining the container a Dakota, Halifax, Valetta, Hastings, York and Lancastrian flew past at low level, some on asymmetric power.

The smallest and largest supply-dropping aircraft represented at Netheravon—a Tempest 2 and a Hastings.

HERE AND THERE



ACADEMIC ADAPTATION: The NC 1071 advanced trainer, first French aircraft with two turbojets, was adapted from the piston-engined NC 1070 naval torpedo-bomber. Type and thrust output of its power units are unspecified, but maximum speed is expected to be between 380 and 430 m.p.h.

French Show for B.B.C.

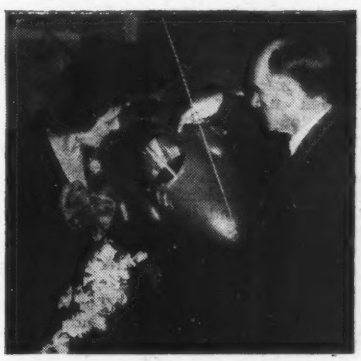
AIR FRANCE have made arrangements to fly the entire theatrical cast of *Lido*, from Paris to London on November 9th, for the television broadcast of their show which is to be made on that date. Two Skymasters will replace the usual Languedocs on this occasion and the time of the service has been advanced four hours to suit the performers. One Skymaster will carry 50 people including the cast, and the other their "props." After the performance the company will return to Paris on November 10th.

Short's Board Changes

MR. D. E. WISEMAN has resigned the joint managing directorship of Short Brothers and Harland, Ltd., but is retaining his seat on the board. Rear Admiral M. S. Slattery, C.B., F.R.Ae.S., R.N. (Retd.), hitherto joint managing director with Mr. Wiseman, has now become sole managing director. Mr. F. C. How, C.B., Under Secretary, Ministry of Supply, has been appointed to fill a vacancy on the board caused by the resignation of Mr. E. B. Bowyer, C.B., made necessary by increased pressure of his official duties with the Ministry of Supply.

British Instruments for Canadair Fours

CRITICS of the Government's decision to purchase 22 Canadair Fours for use on B.O.A.C.'s Atlantic and Middle East routes, may be gratified to learn of Mr. Whitney Straight's stipulation to fit British instrumentation systems throughout these aircraft. The latest development along these lines is that the Canadair's astro-domes are to be replaced by a British periscopic sextant made by Henry Hughes and Son, Ltd. This sextant was exhibited for the first time at this year's S.B.A.C. Display. Mr. P. F. Everitt, designer of the Hughes sextant, has recently returned from Montreal, with a contract to supply 22 such sextants for Canadair Fours. In the Hughes installation, a mounting hatch, built into the skin of the aircraft as a permanent fixture, houses the safety locks for maintaining pressurization, and the sextant is constructed as a separate sealed unit. The latter, in its "up" position protrudes only 3in above the skin of the aircraft. When the sextant is in the "down" position, a link motion ensures that the hatch will close flush with the skin of the aircraft and prevent leakage of cabin pressure.



DESIGN EXHIBITION: H.R.H. the Duchess of Kent examining a model of the DH 108 with Sir Geoffrey de Havilland at the Design for Industry Exhibition which she opened at Burlington House, Piccadilly, on October 26th.

Northrop YB-49 Trials

IN the course of a recent endurance test flight, a Northrop YB-49 eight-jet flying wing remained air-borne for nine hours, 30 minutes; this is claimed to be the longest period for which a jet propelled machine has remained in the air. Flying on a course between Muroc air base, California, and Arizona the speed given for the distance of 3,458 miles flown was 382 m.p.h. not counting 27 minutes flying at a reduced speed preparing to land. The flight was made at between 35,000 and 40,000 feet. Although heavily laden with fuel the YB-49 took off at a weight below its designed all-up weight of 213,000 lb.

U.S. Military Aid Plans

AS part of a scheme for close military co-operation between the U.S. and Western Europe, it is reported from Washington that plans are being worked out to make available to Britain raw materials and machine tools under a military aid programme to be submitted to Congress next January. It is considered that, due to the present state of the American aircraft industry and the demands of her own forces, few Ameri-

MR. FREEMAN'S VISITS: Left, Mr. A. J. Freeman, Joint Parliamentary Secretary M.O.S., seen in a Rolls Royce works laboratory with Mr. Hives the Managing Director, with whom he toured the works. Mr. Freeman also visited Armstrong Whitworth's works and saw the Apollo which is nearing completion. Right, Mr. Freeman on the wing of the Boulton Paul Balliol 2. His visit to this firm is referred to on page 536.

HERE AND THERE

can jet fighters could be made available in the early stages of the military aid programme. Britain, however, could produce excellent jet fighters, but the use of manpower and materials interfered to some extent with British economic recovery. Air Chief Marshal Sir J. Robb is understood to be surveying the needs of France, Belgium, Holland and Luxemburg in respect of both jet fighters and facilities for training pilots and ground staff. On the basis of this survey, to be studied by American Joint Chiefs of Staff, the military aid programme would be drawn up for submission to Congress.

Mr. Freeman at Boulton Paul

WHILE visiting Boulton Paul Aircraft, Ltd., at Wolverhampton, Mr. J. Freeman, Parliamentary Secretary to the Ministry of Supply, flew in a Balliol T2 with Mr. P. Tisshaw, the company's assistant test pilot. Mr. Freeman requested performance of aerobatics, and after the flight commented on the manœuvrability of the machine and remarked: "It must have been safe, they let me fly it." He also spoke of the importance of co-ordinating research teams whose work might give Britain a world lead in supersonic aviation. The Balliol T2 is powered by a Merlin engine.

Institute of Metals New Session

PROGRAMMES of the various local sections of the Institute of Metals for the 1948-49 Session have been issued by the Institute. The annual dance of the London Section will be held on December 3rd and among the numerous lectures to be given in this session is one by Col. W. C. Devereux, F.R.Ae.S., on the "Structural Uses of Light Metals"; this is to be given on March 10, 1949. In the Scottish Section's programme Mr. G. Meikle, B.Sc., F.I.M., will lecture on the uses of Non-Ferrous Metals for Aircraft, on Dec. 13th. The Manchester Metallurgical Society's programme includes a lecture on metallurgical problems connected with jet engine components by C. G. Conway, B.Sc., on March 2nd. 1949. Full details of the new session can be obtained from the Institute of Metals, 4, Grosvenor Gardens, London, S.W.1.

METEORS FOR EXPORT: The first three Meteors for the Royal Netherlands Air Force photographed on their arrival at Twenthe airfield, Holland. Mr. R. Dryland, Gloster test pilot, can be seen climbing from the Meteor in the foreground.

Swedish Survey Company

HIS many friends the world over, and particularly in this country, will be pleased to learn that Erik Jägerblom has now established his own firm of aerial photographers in Sweden under the name of A/B Aeronautic.

Erik Jägerblom

Erik Jägerblom was with A/B Aero Materiel of Stockholm for 20 years and it is the photographic department of this company which Erik has purchased to form the nucleus of his new concern. The address of A/B Aeronautic is: Birger Jarlsgatan 6, Stockholm, Sweden.

Pilot Prosecuted

FOR piloting passengers while not in possession of the necessary licence, for carrying a passenger in excess of the seats provided and for failing to keep a pilot's log, Mr. A. C. L. Barrett, the Managing Director of Astral Aviation, Ltd., of Newcastle, a former R.A.F. officer, was fined a total of £37 and 10 guineas costs at West Hartlepool on October 26th. Mr. Barrett pleaded guilty but in his defence it was stated that he had flown more than thirty types of aircraft on operations during six years of the war and had held a licence for private flying since 1938. Owing to a slight defect in the muscle of one eye he did not hold a licence for piloting passengers. The circumstances in which the offending flight was made were when three members of a party flying to Doncaster Races arrived late and were left behind. They persuaded him to take them in another aircraft in which one passenger, owing to insufficient seating accommodation, had to sit on a cushion.

News in Brief

By July, 1949, the U.S. Navy expects to have 14,500 aircraft, according to reports from Washington. To bring the numerical strength up to this figure it will be necessary to take 3,000 aircraft of types used in the war, out of storage.

The Dunlop Rubber Company, Ltd., announce that the Hon. J. Kenneth Weir, C.B.E., has been appointed a director of the company. He is managing director of G. & J. Weir (1947), Ltd.

* * *

Steps are being taken by the Ministry of Supply to implement a pledge given by the Ministry of Aircraft Production that the dispersal factory of Short's, at Calgarth, on the shore of Lake Windermere, would be removed as soon as practicable. Offers for the factory are invited by the M.o.S.

* * *

When the Harvard in which they were flying collided with a Vampire over Takali airfield, Malta, on October 25th Lt. A. E. Matthews, R.N., and Lt. A. D. Marsden, R.N., were killed. The pilot of the Vampire, S/L. I. G. Potts succeeded in landing safely and was unhurt.

* * *

The Wright Brothers' aircraft, the *Kittyhawk*, will replace Charles Lindberg's *Spirit of St. Louis* in the position of honour in the Smithsonian Institute at Washington on its arrival from London. Lindberg's aircraft, in which he flew the Atlantic 21 years ago, has been the first sight to greet visitors to the Institute since 1928 and it is now being moved to make way for the *Kittyhawk*.

OUT FOR A CONSTITUTIONAL: An impressive photograph of the Lockheed Constitution making a rocket-assisted take-off test. As reported in "Flight" October 28th, rocket reaction lasts for about 15 seconds.

CIVIL AVIATION NEWS

LONG-DISTANCE CALLER: A Panair do Brazil Constellation landed at Stuttgart on October 7th at the end of a proving flight from Buenos Aires, and is seen in front of the terminal building at Echterdingen Airport. The company flies a monthly service through Rio de Janeiro, Recife, Dakar, Lisbon and Paris to Frankfurt, but the German terminus may be changed.

Scandinavian Airlines Need Larger Subsidies : New Licence Qualifications and Examinations : Modern Terminal at Lima

IATA TRAFFIC CONFERENCES

FOR about two weeks commencing November 9th representatives of the three IATA Traffic Conferences will meet at St. George's, Bermuda. The Conferences are made up of members operating airline services in the three regions covered by Traffic Conference I, North and South America, Greenland and the Hawaiian Islands; Traffic Conference II, Europe, Africa and the Middle East including Iran; Traffic Conference III, Asia, Australasia and the islands of the Pacific. At Rio de Janeiro last year joint sessions were held and international agreement was reached on several hundred traffic resolutions. It is the intention to hold similar joint sessions at Bermuda in considering proposals on long routes, and those proposals of international importance. Items to be discussed will include recommendations on passenger fares and cargo rates for the period beginning in the 1949 summer season, and also proposals for further standardization and for simplification in international traffic procedures. Since the joint meetings are being held in the area of Air Traffic Conference No. I. Mr. Willis G. Lipscomb, Vice-President Traffic and Sales, P.A.W.A., will be Chairman.

SCANDINAVIAN RETRENCHMENT

IT is reported that the Scandinavian airlines, too, are suffering from the effects of over optimistic planning in the immediate post-war period. A substantial number of S.A.S. employees have been suspended as part of a general economy, for which the present world economic and political situation has been blamed. It has been suggested, however, that as in other airlines there was a tendency to over-staff. It is estimated that during last year A.B.A., D.D.L. and D.N.L. have lost the equivalent of £1½ million compared with about £½ million in the previous year.

The A.B.A. strike early this year is estimated to have cost the company about 6 million kroner, and travel restrictions have reduced bookings to an uneconomic level. Air freight has suffered in a similar way. A.B.A. economies have included the discharge of 304 employees including 56 pilots, 36 wireless operators, 12 stewardesses and 200 ground staff from a total strength of some 2,750 employees. D.D.L. have lost about 11,300,000 kroner this year and the management appealed to the Government for financial aid. The Budget Committee replied with an increase in the annual subsidy of 500,000 kroner —2½ million kroner for the years 1948-1951, repayment to be made at the rate of 15 kroner per flown kilometre up to 5 million kilometres a year. It is understood that a similar increase has been made by the municipality of Copenhagen, the annual contribution of which has been increased from 100,000 to 500,000 kroner. During 1947 the company received contributions from the Treasury and the City of Copenhagen on the condition that no dividends to stockholders would be offered without the consent of the Minister of Communications. The non-payment of dividends is not understood to have caused anxiety however since D.D.L. was reorganized primarily with the aim of gaining a foothold in international aviation, and in this the company has undoubtedly succeeded. In the first half of this year S.A.S. average bookings amounted to 46% of capacity, but economic operation on the four-engine aircraft requires a load of 60-70% and on Dakotas 80%. It has been suggested that services may be cut and some aircraft sold.

AIR FRANCE EXCURSIONS

STARTING on November 1st Air France have introduced excursion rates for services from Glasgow to Paris, Nice, Cannes, Monte Carlo and Rome. On return tickets valid for 30 days reductions range from £3 to £5, for example, the fares to Nice have been reduced from £49 17s to £46 6s. Further reductions have been made in the fares from London to Lisbon and from London to the Riviera, but there are slight increases on the services to Haifa.

PILOTS' HOURS FOR NEW LICENCES

NOTICE to Airmen No. 371 has announced that the total number of hours flying experience required as pilot for the new professional pilots' licences and instrument rating may be made up as hours in command and as co-pilot. Requirements are 200 hours for the commercial pilots' licence, 700 for the senior commercial pilot and 1,200 for the airline transport pilot and flying time as co-pilot will be counted as only half. If, for example, a candidate for the airline transport pilots' licence has only the minimum of 250 hours in command and wishes to make up the remaining 950 hours by co-pilot time, he will require 1,900 co-pilot hours to do it.

For the new student pilots' and private pilots' licences

Civil Aviation News . . . . .

written papers in aviation law, and elementary navigation and weather in relation to cross-country flying will take the form of "objective multiple choice tests." Candidates will be given a number of possible answers to each question, the correct one of which must be marked with a cross. The examination on Aircraft will be a normally written paper for categories heavier than 12,500lb, but oral for single engine light-weights and multiple-engine light-weights. The latter will be conducted by a Royal Aero Club official observer or by the Ministry of Civil Aviation at the option of the candidate.

NORTHOLT AIRPORT

THE second of a series of booklets being produced on M.C.A. airports is now available. It gives an interesting account of the development of Northolt from the days when Major Brancker personally chose the site during a solo air survey 33 years ago, to the civil developments of the present day. Articles cover meteorological organization, passenger comfort and accommodation at the airport, maintenance of British European Airways' aircraft, running repairs at the airport including the up-keep of runways, hangars, workshops and lighting, and an amusing air quiz of eight types of aircraft most frequently seen at Northolt airport, and a short description of the airlines themselves. The booklet is well illustrated and the centre spread includes a map showing the direct European air routes operated from London's Continental Airport.

DANISH SURVEY OF FAROE ISLANDS

REPRESENTATIVES of the Danish Government have been investigating the possibility of opening a new air service between Copenhagen and the Faroe Islands. The airfield at Vaagoe, built for the R.A.F. during the war, does not comply with international safety standards and extensive surveys of the islands have been made from the air with a view to finding a more suitable site. Another projected route between Copenhagen and Bluie West One, Greenland, is also under discussion. It has been estimated however that neither route can be operated at a profit and a final decision on future development is awaited from the government.

CHARTER ACCIDENT REPORT

THE accident which occurred to Halifax C VII G-AIHU on December 5, 1947, in North Wales has been investigated and reported upon by the Chief Inspector of Accidents. On the morning of the accident the aircraft, which was operated by the Lancashire Aircraft Corporation, Ltd., flew from Bovingdon to Lille to collect freight for delivery to Speke Airport, Liverpool. At Lille a direct flight to Speke in IFR conditions was planned and the aircraft took off at 14.38 hours. During the early part of the flight W/T communication was established with Uxbridge Area Control and three positions were reported. The last plot showed that after 57 minutes' flying the aircraft was 31 miles off its course. At 1546 hours Uxbridge Control instructed the aircraft to communicate with Northern Area Control (Ringway). At 15.59 hours G-AIHU tried unsuccessfully to establish communication with Ringway and Ringway in turn tried unsuccessfully to call the aircraft at 1602 hours and 1604 hours. All subsequent messages were between the aircraft and Speke Approach Control. It was while flying a QDM that G-AIHU crashed into the summit of Cwm Mountain in conditions of poor visibility 16 minutes after its ETA at Speke.

The pilot, Capt. J. H. Parsonage, D.F.C., had completed a total of approximately 2,000 flying hours, of which 1,025 hours were in Halifaxes. His night flying hours totalled 580. Visibility at Speke at about the time of the accident was down to 900 yards due to fog, and there was nine-tenths cloud at 1,200 feet. The Inspector found that crew

British Airways' Operating Statistics for July 1948

DURING July this year there was a noticeable increase in the amount of mail and freight carried by B.E.A. This was largely due to the introduction, during that month, of "all-up" air mail services to most European countries. Although route mileage has altered little since July, 1947, the hours flown were considerably less, particularly in the British Division. B.E.A. Continental Division flew many more passengers, but the average load was lower. The number of passengers carried in B.O.A.C. was higher than last year and the average load was greater, particularly in the Africa and Middle East Division, which also showed a large increase in freight traffic. All Divisions of B.O.A.C. provided a greater average capacity. B.S.A.A. operations altered very little except for a slight increase in the number of hours flown, due to greater route mileage. Figures for July, 1947, are shown in brackets.

	B.E.A. All Divisions	B.E.A. British Division	B.E.A. Continental Division	B.O.A.C. All Divisions	B.O.A.C. Atlantic Division	B.O.A.C. Africa and Middle East Division	B.O.A.C. Eastern Division	B.S.A.A.
Passengers carried	77,319 (68,898)	53,691 (52,920)	23,628 (15,978)	11,742 (9,661)	4,135 (3,206)	4,541 (3,785)	3,066 (2,670)	1,402 (1,174)
Mail (tons)	236.3 (102.4)	102.4 (58.1)	133.9 (44.3)	143.0 (128.2)	26.2 (23.7)	53.6 (44.6)	62.6 (59.9)	14.5 (13.6)
Freight (tons)	479.3 (240.1)	118.1 (105.3)	361.2 (134.8)	280.0 (153.7)	41.5 (21.0)	151.7 (65.0)	86.8 (67.7)	43.2 (41.1)
Average Load : Passengers (No.)	14.4 (10.5)	13.0 (7.4)	15.8 (16.7)	17.6 (13.3)	28.8 (31.5)	14.0 (9.7)	16.9 (11.7)	11.4 (11.2)
Total (lbs.)	3,003 (2,090)	2,399 (1,333)	3,489 (3,503)	4,993 (3,943)	7,404 (7,506)	4,071 (2,823)	5,050 (4,046)	3,668 (4,163)
Average Capacity Available : Seats (No.)	20.8 (13.6)	18.1 (10.2)	23.1 (20.7)	23.8 (17.9)	42.6 (41.1)	19.3 (13.6)	21.2 (15.7)	17.6 (18.3)
Total (lbs.)	4,740 (3,303)	3,910 (2,207)	5,409 (5,353)	7,520 (5,674)	11,765 (11,029)	6,532 (4,301)	7,026 (5,530)	6,486 (6,815)
Average length of haul : Passenger	246 (208)	151 (130)	461 (469)	3,022 (2,851)	2,278 (2,496)	2,724 (2,288)	4,469 (4,076)	3,495 (3,726)
Mail	428 (399)	159 (115)	634 (772)	4,608 (4,408)	3,457 (3,401)	3,207 (3,204)	6,300 (5,703)	5,663 (5,825)
Freight	426 (456)	180 (146)	507 (699)	3,348 (3,309)	2,986 (3,030)	2,149 (2,298)	5,617 (4,366)	5,538 (5,682)
Hours flown : Revenue : passenger services ...	9,315 (11,207)	5,226 (8,504)	4,089 (2,703)	11,110 (11,424)	1,393 (1,146)	4,896 (5,102)	4,821 (5,176)	2,103 (1,910)
cargo services ...	567 (296)	— —	567 (296)	963 —	— —	190 —	783 —	243 —
charter and special flights	73 (87)	73 (72)	— (15)	69 (281)	— —	27 (281)	41 —	— (16)
Non-revenue, total	271 (262)	136 (160)	135 (102)	1,798 (1,800)	696 (601)	314 (559)	788 (640)	245 (65)
Equivalent annual utilisation (revenue hours flown) per aircraft	1,576 (1,374)	1,434 (1,426)	1,778 (1,234)	1,300 (1,395)	— —	— —	— —	1,456 (1,460)
Unduplicated route miles in operation at end of period	16,062 (16,452)	4,371 (5,715)	11,691 (10,737)	63,502 (60,708)	8,523 (7,746)	30,633 (30,081)	29,285 (31,495)	24,622 (18,085)
Percentage regularity	94.4 (96.5)	93.2 (96.2)	98.3 (99.3)	99.3 (99.3)	100.0 (100.0)	98.7 (99.7)	99.8 (98.5)	100 (99.4)
Average length of stage flights (miles)	183 (125)	115 (95)	393 (362)	952 (821)	1,101 (1,095)	800 (629)	1,098 (1,058)	962 (1,242)

licences and loading of the aircraft were in order, but the Journey Log Book had not been maintained in accordance with instructions, neither had communication with Northern Area Control been established as instructed. Communication with Speke Aerodrome Control was not established on R/T for reasons which could not be attributed to the ground station, and no use was made of the Speke MF landing approach beacon. The captain had not reported reaching 2,000 feet, as instructed, and had reduced height to low level without notification or instruction. Also, he did not establish his position at the time of asking for landing instructions, neither had he indicated that he was unaware of his approximate position. The Inspector considered that in view of the failure of the aircraft to report that it was 2,000 feet as instructed, and having regard to its signalled ETA, the Controller should have asked for the aircraft's position and new ETA before complying with the request for landing instructions. The landing instructions signalled were not in accordance with the latest instructions, also the group QHG was corrupt in that it was not implemented by a height, and the addition of the extraneous group QFM 1,000 was necessary owing to the omission in the QHG group. The collective meaning of the message was not, however, misleading. When at 1632 hours the landing instructions signal was passed, the aircraft was already flying at a very low height. The fact that these instructions were given by the Controller without requesting the aircraft's position had, therefore, no bearing on the accident.

The Inspector of Accidents concluded that the accident was caused by the Captain's disregard of the Controller's instructions to enter the Zone and to report when he had reached 2,000ft, his failure to make use of the available navigation aids, and his attempt to locate the airfield by low-level flying during conditions of bad visibility.

AFRICAN INTEREST: Air Vice Marshal Sir Charles Meredith, Chairman of Central African Airways, flew in the Airspeed Ambassador during a recent visit to this country. He and the Chief Pilot of C.A.A., Capt. Downing (right), who flew the aircraft, are seen here with Mr. G. B. S. Errington, left, the Airspeed Chief Test Pilot.

NEW PERUVIAN TERMINAL

A B.S.A.A. aircraft was the first to use the new Limatambo Airport terminal building at Lima, Peru. The terminal was built under the anspices of the Government-controlled Corporación de Aeropuertos y Avación Comercial (CORPAC) and was opened by the President of Peru last mouth. It is a five-storey reinforced concrete building, the main features of which include a main central lobby in which all major airlines operating from Peru have ticket counters. Around it there are six passenger waiting rooms, a large restaurant, lounge and cafeteria. There is also a gallery of shops, two banks and the usual accommodation for customs, immigration, health and police. The basement of this building has been designed for the Post Office, and for the storage of freight and baggage for the operators. Air Traffic Control is on the third floor and the airfield side of the control tower is of glass to give an unrestricted view of flying. On the same floor is the Meteorological Department with up-to-date facilities for weather forecasting. The first radio teletype to be used in South America will eventually be installed in the Communications Centre which will also include equipment for voice communications, and continuous wave transmission. Also in the terminal building are offices for CORPAC and ICAO and all operators using the airport. There is also sleeping accommodation for twelve pilots. There are so far only two runways at the Airport but future plans include a third about 3,000 yards long especially for the installation of the Instrument Landing System but which will, of course, be used for normal operations.

BREVITIES

THE Pacific-Alaska Division of Pan American Airways carried 13,290 passengers in August and 10,694 in July this year.

* * *

Indian National Airways, Ltd., have started a daily morning service between Delhi and Lahore returning before lunch. An afternoon service will operate three times a week on Tuesdays, Thursdays and Saturdays.

* * *

It is understood that a suitable site for a new airport is to be selected in the neighbourhood of the Finnish town, Uleaborg. Sites at Kello, Kuivasjärvi and Oulunsalo are being inspected and it is possible that construction will be commenced at an early date.

* * *

The D.N.L. Northern Norway route closed for the winter on October 21st. During the six months' operation, which started on April 19th this year, 23,000 passengers have been flown on that route. During 1947 D.N.L. carried about 100,000 passengers on both inland and foreign routes.

* * *

A new freight service has been opened by Aer Lingus on the Dublin-Glasgow route. Such a service has not been previously possible owing to lack of freight Customs clearance facilities at Renfrew. Although freight space in passenger aircraft will be used in the initial stages, it is probable that special freighters will eventually be employed.

Capt. P. G. Taylor, M.C., G.M., who was associated with the late Sir Charles Kingsford-Smith on several of his flights has been appointed a director of Trans-Oceanic Airways, Ltd.

* * *

Between January 15th and October 2nd this year American Overseas Airways carried 20,377 westbound and 13,938 eastbound passengers.

* * *

Hall's International Aviation Bureau, Ltd., has amalgamated with Aircraft and Engineering Services, Ltd., at Croydon Airport. Both companies will continue to operate individually, the Bureau with travel agency offices in London and at Croydon, and Aircraft and Engineering Services, Ltd., with its sales, maintenance and repair organization at Croydon.

* * *

Sir George Cribbett, deputy secretary to the Ministry of Civil Aviation, has been nominated by Lord Pakenham to be associated with B.O.A.C. in the overhaul of that Corporation's organization. Mr. T. F. Bird, head of the Economic and Engineering Division of the Ministry, has been nominated for a similar association with B.E.A. in conjunction with Production Engineering, Ltd. As previously announced in *Flight*, the executive responsibility for B.O.A.C.'s reorganization has been assumed by Sir Miles Thomas. It is understood that these arrangements have been made in agreement with the Corporations and in the exercise of the Minister's ultimate responsibility for the whole field of civil aviation, and further

Civil Aviation News . . . . .

with the object of avoiding functional overlapping between the Ministry and the Corporations.

* * *

Mr. G. S. Lindgren, Parliamentary Secretary to the Ministry of Civil Aviation, will open a new passenger terminal building at Nutts Corner Airport, Belfast, on November 26th. B.E.A. are at present the chief users of the airport.

* * *

The Ministry of Civil Aviation announce that Mr. Ronald S. Kinsey has been appointed Civil Air Adviser to the U.K. High Commissioners in India and Pakistan and has now left for New Delhi. Mr. Kinsey, who is 34 and a barrister-at-law in the Inner Temple, joined the M.C.A. Legal Department in June, 1946.

* * *

The Finnish company Aero O/Y has started a new service from Tammerfors through Abo to Stockholm using DC3s. The Polish company L.O.T. has opened a new service on a weekly frequency between Warsaw and Copenhagen.

* * *

Regulations have been issued by the Minister of Civil Aviation establishing a joint pension scheme for full-time employees of the three British Airways Corporations. The scheme does not include the air crew categories of Pilot, Navigating Officer, Radio Officer and Engineer Officer but further regulations dealing with those categories will follow.

* * *

Lord Pakenham, the Minister of Civil Aviation, has decided that a public Court of Investigation shall be held into the loss of the K.L.M. Constellation PH-TEN near Prestwick on October 21st, 1948. Preliminary investigations are continuing and a further announcement will be made giving the composition of the Court and the date on which the investigations will open in Scotland.

* * *

Three new members, Australia, the Argentine and Turkey have now joined the International Union of Official Tourist Organizations, bringing the total membership to 34 nations. Representatives of 12 nations attended the recent meeting of the Union in Lausanne where it was announced that the next meeting of the International Congress would be held in Luxembourg in September, 1949.

* * *

After Mr. David Lamb's inaugural address as President of the Institute of Transport, an informal dinner of the Council was held in the Institute's new headquarters, 80, Portland Place, on October 18th. The Minister of Transport, Mr. Barnes, attended the function and stressed the importance of the work of the Institute whatever the manner in which the organization of transport developed.

TRANSPORT OCCASION: At the Institute of Transport Council House Dinner on October 18th were Mr. T. W. Royle, a past President; the Rt. Hon. Alfred Barnes, Minister of Transport; Mr. David R. Lamb, President of the Institute and Editor of "Modern Transport"; and Sir Frederick Handley Page, also a past President. The latter appealed for further support of the Institute's Premises and Development Fund.

* * *

It is reported from Ceylon that the first international scheduled air service between Ceylon and Australia will be started early next year by a new airline, Air Ceylon International.

* * *

After a successful seven-months' season the spectators' enclosure at Prestwick Airport closed on October 31st. During the season there were 42,490 visitors as compared with 4,742 in 1947, and 2,843 conducted tours were arranged compared with 205 in the previous year. Well over 9,000 passengers were carried by Scottish Aviation, Ltd., on short pleasure flights from the airport, and next year it is proposed to broadcast an account of movements of aircraft at regular intervals from the Control Tower.

FROM THE CLUBS

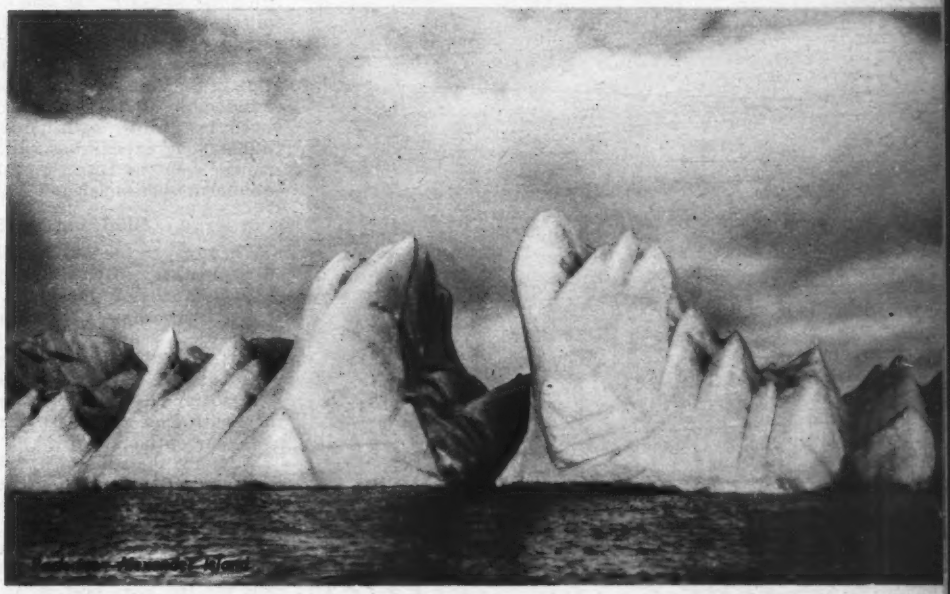
FOLLOWING the cessation of flying instruction by the Cinque Ports Flying Club and the opening of the Kent Coast Flying Club at Lympne, announced in *Flight*, October 14th, it is now learned that all flying members of the former club have agreed to the transfer of membership and, in addition, eight new members have joined the Kent Coast Club. The services of Mr. R. M. Hackney, previously C.F.I. at the Cinque Ports, have been secured by the new club. Conversion instruction from Tiger Moths to Magister aircraft is now proceeding. It is hoped that the temporary club house and offices now in use at the Air Kruise corner of the airport will be converted to provide amenities for ground instruction and social activities, both of which are essential for the encouragement of private flying and the success of the new venture. The rate for Magister instruction is £2 10s per hour.

* * *

A SUCCESSFUL season is reported from the Midland Bank Flying Club which operates from Fairoaks. During the summer 16 new A licences have been gained by members and the hours flown since the club year commenced in May total 652. The club is indebted to Mr. Peter Masefield for his lecture on the future of British Civil Aviation which was given to members on October 26th at the R.Ae.S. On November 9th another lecture in the winter programme is to be given; the speaker, Mr. A. C. Clarke, chairman of the British Interplanetary Society, has chosen as his subject, "Rockets and Space Flight." Open afternoons at Fairoaks have been popular during the summer, and club outings included a tour of Northolt Airport and a visit to the S.B.A.C. Display at Farnborough, at which the members got decidedly wet! A keen interest in flying is pervading the Midland Bank through the enthusiasm of the club members

AN address from the president of the Derby and District Aero Club opened the annual general meeting of the club on October 24th. In this address Mrs. J. Harben reviewed the activities of the past year and thanked members and committee for their loyalty and support over a difficult period for civil aviation in general and club flying in particular. She felt that the club could congratulate itself on the progress made.

In the absence of the chairman through illness a letter from him was read by W/C. A. McDowall, D.S.O., A.F.C., D.F.M., temporarily in the chair, which detailed the results achieved during the year. In the 12 months ended September 30th, 1,250 hours had been flown compared with 918 in the preceding year. Private owners had increased from 3 to 9 and 12 new A licences had been obtained by members. The club had been well represented at rallies at home and abroad and, although it had not undertaken a display of the magnitude of the 1947 International Air Rally, it had assisted in the organization and flying programme of the At Home held by No. 16 R.F.S. during June. In October a new competition had been introduced between the club and the Wolverhampton club, taking the form of a relay race for a trophy presented by Air Schools, Ltd. This was so successful that it is certain to become a popular annual event. The chairman concluded his letter by reflecting that, bearing in mind the poor flying weather and difficult economic situation, the club's progress had been satisfactory but stressed that the future depended upon members giving their enthusiastic support. In a reference to the social side of the club it was reported that members felt they had been well catered for socially, and that both the annual ball and the monthly dances had been well attended and popular. At the conclusion of the meeting a cocktail party was given by the chairman and committee.



ANTARCTIC AND AVIATION

By FRANK ILLINGWORTH

THE argument over the ownership of Antarctic territory due south of Cape Horn is likely to intensify in the near future. Britain's claim to this territory is incontestable in International Law and is not likely to be dropped; likewise, Chile and Argentina show no signs of weakening in their demands, and it is thought in Whitehall that both these countries will take advantage of Britain's preoccupation in Europe to land task forces within hailing distance of each of the seven British outposts in the Antarctic during the coming Far Southern summer.

Chile's claims are based on facts no more material than that the Antarctic islands off Grahamland were once part of the South American continent and are therefore within the Chilean sphere; and Argentina lays claim to this same area on the basis that she has maintained one (British-built) meteorological station there, which station she was allowed to man only with the permission of the British Foreign Office.

We may one day have trans-south polar air routes, but meantime a circum-polar chain of met. stations is the aim of the Powers interested in air transport and whaling in the Southern Hemisphere, explains the author (who was asked to join the British Expedition now on its way to the Antarctic).

The Colonial Office's supply ship John Biscoe *off Signy Island, where there is a British met. and wireless station. Marine (whale) biology is the main scientific work being done.*

Both Argentina and Chile have refused the British suggestion that the argument be placed before the International Court at The Hague, and have turned down the U.S. proposal for a world conference of the countries interested in the Far South.

The United States neither admits nor denies the claims of other countries in Antarctica, which attitude has led to close co-operation between British and American land and air expeditions in the Far South.

Group Captain Alexander Campbell is leader of the Australian parties in the Antarctic.

What is the reason for the marked international interest in the 5,000,000 square miles of ice at the bottom of the world?

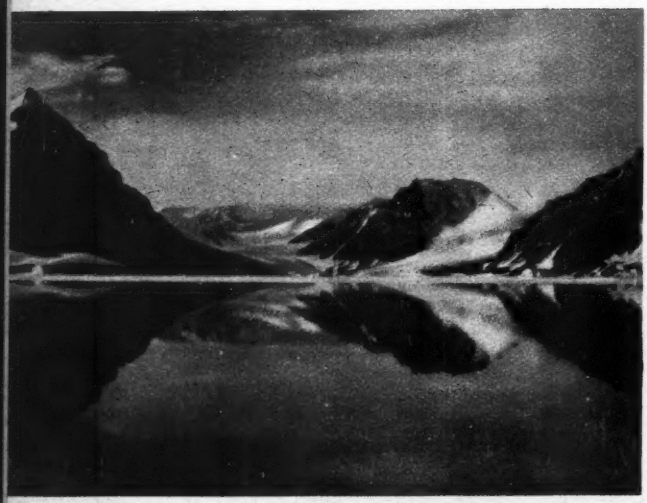
The first answer is that the storms that rage across an ice continent larger than Europe affect weather conditions over much of the South Atlantic, South Pacific and South Indian Oceans, and a chain of meteorological stations in the Antarctic would make for safer air and sea communications in the Southern Hemisphere.

This the primary reason for South Africa establishing herself in Prince Edward and Marion Islands last February, and Australia in the incredibly lonely and wild Macquarie and Heard Islands.

Permanent scientific outposts are being set up there for the study not only of meteorology but of cosmic radiation and radio transmission. Radio contact was first made between the Canadian Arctic and the Australian Antarctic last February; further experiments are to be made.

It is significant that the leader of the Australian parties is an airman, Group Captain Alexander Campbell, formerly of the R.A.F.

Washington's *Aviation Daily* stated recently that "Australia and South Africa are considering plans to open an air route to Britain via the South Polar regions in the event of the Middle East being closed to air transport."



This fjord is jammed with ice for ten months of the year. It leads to Marguerite Bay, Stonnington Island, the most southerly of the Colonial Office's polar outposts in Grahamland, 1,000 miles south of Cape Horn.

ANTARCTIC AND AVIATION

However this may be, major air bases, both military and civil, could certainly be maintained in the Antarctic.

Recent years have seen considerable strides made in polar aviation. What Canada and the United States have learned in the Far North is now being added to by Britain and America in the Far South.

Admiral Byrd's antarctic task force of 4,000 men in the winter of 1946-47 included helicopters and aircraft with wing spans of up to 94 feet.

He tested the practicability of maintaining airfields in the Far South, at least in Grahamland, where, it is thought, there are immense oil deposits.

British and U.S. aircraft, ranging from Austers and Moths to four-engined machines, operated from the decks of three survey ships (the Australian-owned *Wyatt Earp* and two U.S. icebreakers) and from the American and two British bases in Grahamland this time last year.

British aircraft will take up their survey this coming Antarctic summer, and the Colonial Office's polar supply ship *John Biscoe* is now on her way south with a further supply of aviation fuel.

The buildings of the Marguerite Bay base stand out against the mountains of Grahamland. In the foreground boxes from supplies put ashore from the John Biscoe last year.

It is not certain whether American aircraft will be operating in the Antarctic this year. But last year they added considerably to the immense area of new territory surveyed by British light aircraft. The U.S. and British Grahamland expeditions, although under separate commands, were in effect working as one unit, exchanging equipment, personnel and experience in polar aviation.

Sledging by Petrol Tank

When one of the two British aircraft there crash-landed in September, 1947, the crew were rescued by a twin-engined American machine. The latter landed in extremely hazardous circumstances after the British crew had made a ten-days' journey across the ice, using their Auster's belly-tank as a sledge.

Argentina's efforts in the field of South Polar aviation have so far been restricted to one (reported) flight across the South Pole early last year, by Rear-Admiral Portillo of the Argentine Navy.

No doubt the admiral learned on his reported flight that the speed with which the weather changes in the Antarctic makes aviation dangerous. And when it is overcast, the surface of the snow vanishes so that in walking one may stumble over hummocks which cannot be seen from a distance of three feet. Flying in these circumstances calls for the very best in airmen and equipment. Both are available, and it is possible there exists deep in Antarctica comparatively ice-free areas suitable for airfields.

Survey-aircraft of the 1946-47 Byrd Expedition discovered an ice-free "oasis" near the Vestfold Mountains and a second some 500 miles to the east of Knox Land. The latter covered 40 square miles, and its unfrozen lakes are reported to be large enough for seaplanes, the adjoining snow-free land for heavy aircraft. A similar "oasis" was sighted from a German aircraft before the war, and this may be among the goals of an Anglo-Scandinavian expedition planned for the coming year; it will be supplied by air on its inland treks.

The reason for these comparatively snow-free areas is thought to be volcanic, and in time they may prove invaluable as bases for the further exploration of the Antarctic hinterland by air, and *for the establishment of bases on trans-South Polar air routes.*

"Cold research" in Alaska and Arctic Canada, and research in polar navigation no less by the R.A.F. than by Canadian and U.S. airmen, is calculated to make south polar flying safer, and therefore wider.

When we knew as much about Northern Canada as we now know about the Antarctic, Voltaire called the former "a few acres of useless snow." In 20 years this "few acres" has become vitally important strategically, industrially and in civil aviation.

The Powers appreciate well enough that what came to pass in the Far North might well be repeated in the Far South. Scientific developments in the last few years confirm the likelihood of this, and the Powers are accordingly staking their territorial claims.

Their number includes Britain, Australia, New Zealand, South Africa, Argentina, Chile, France, Norway, Sweden, each of which, except New Zealand, will have at least one full-scale expedition in the field by the coming spring. The U.S.S.R. may also enter the field, for last year Soviet whale-catchers entered the Antarctic whaling grounds for the first time, and at one time last winter it was thought the Soviet might land on Prince Edward Island and Marion Island, which conjecture prompted the Dominion of South Africa to despatch an expedition to these islands by warship.

Aircraft are an integral part of the modern whaling fleet, and meteorological stations are also necessary to their successful operation.

Meanwhile, the south polar islands have an immediate purpose in the improvement of aviation in the Southern Hemisphere, in the provision of a circum-polar chain of met. stations.

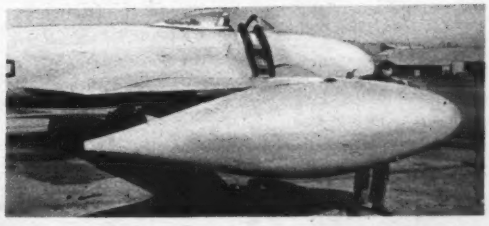
SOME CONSIDERATIONS AFFECTING DESIGN—PART I

THE substance of the accompanying "Flight" article, and of the concluding portion to follow in the next issue, formed the basis of a lecture delivered by H. F. King, M.B.E., to the Derby Branch of the Royal Aeronautical Society on Monday, November 1st.

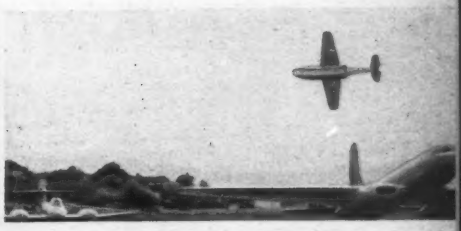
AERODYNAMICS

FIGHTERS

ARMAMENT



TANKAGE



PERFORMANCE

THE revision of technical and tactical ideas occasioned by the advent of aircraft turbines has proved more drastic even than that which arose from the adoption of monoplanes, but in respect of fighters at least, the attendant problems have been so vigorously dealt with that the broad pattern of development for some years ahead may already be discerned.

A prerequisite for a study of technical characteristics is the clear comprehension of present-day operational needs. The rough-and-ready concept of a "fighter" as a machine characterized by high speed, extraordinary manœuvrability, heavy offensive armament and short endurance is seriously deficient. There are fighters to-day which, though not conspicuous for speed, are none-the-less satisfactory in their prescribed rôles. Others are relatively unmanœuvrable, but accentuate specific qualities, while on the score of range it can be said that some fighters are superior to certain types of bomber.

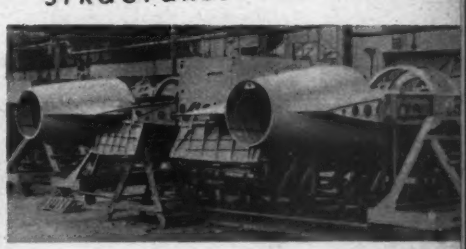
That a higher degree of specialization must be accepted is as obvious as it is—to us in Great Britain, at least—unpalatable. Deficiencies of funds and man-power have obliged the R.A.F. and Naval Aviation to depend on what, to many people, appears a dangerously small number of types; thus, if modern design technique is to be truly represented, it will frequently be necessary in the course of this survey to instance foreign practice.

What might be termed the "built-in excellence" of British fighters has enabled standard types to be successfully adapted for duties not laid down in the original specifications. This quality has never been more apparent than in the Meteor, Vampire, Hornet, Sea Fury and Seafire. While

VISION

ACCESSIBILITY

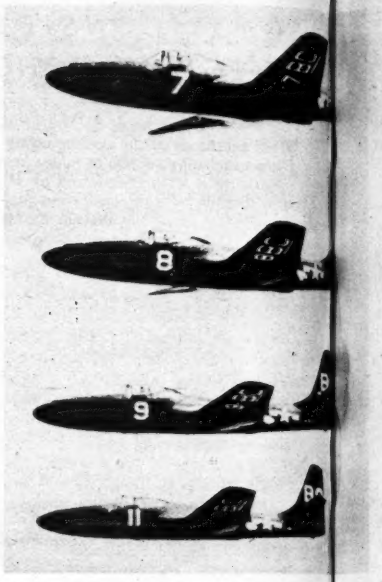
STRUCTURES



acknowledging the merits of these admirable "general-purpose" designs, however, it is wise to reflect that in the late war the R.A.F. was somewhat embarrassed (to cite but one instance) by the enemy's employment of specialized, high-altitude bombers, cruising over this country and the Middle East at levels well above the ceiling of defensive fighters. Hasty modification and stripping of standard Spitfires and Mosquitoes met with very limited success against these annoying marauders, and the belated outcome was the Welkin—perhaps the most highly specialized machine ever built to R.A.F. requirements.

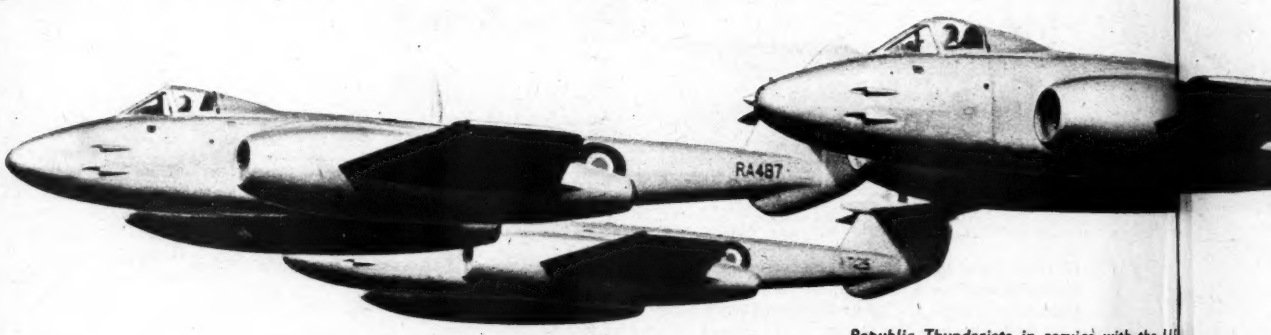
The *raison d'être* of all fighter aircraft being the destruction of the enemy in the air, it follows that design criteria should be (1) the nature of the opposition and (2) the circumstances in which this is likely to be met—whether at short or long range, as the result of interception or patrol, by day or night, in fair weather or foul, at high, medium or low altitude. This will postulate the most intimate collaboration between Intelligence and those authorities responsible for stating technical and operational requirements. Had the Americans been aware in the early days of the Pacific war that Japanese fighters possessed such powers of manœuvrability (achieved largely at the cost of vulnerability) their design policy might well have taken a different turn.

Inadequate technical intelligence and the inability to predict the course of possible campaigns is further prolonging the life of the general-purpose or "good all-round" fighter—a class which is doubly favoured in being inherently suitable for the attack of ground targets. That this breed will survive for some years, especially in Naval air arms and for Army support, is not to be doubted, but that it will be increasingly handicapped when matched with more specialized



McDonnell Phantoms of a U.S. Marine Squa

FIGHTERS . . .



Republic Thunderjets in service with the U

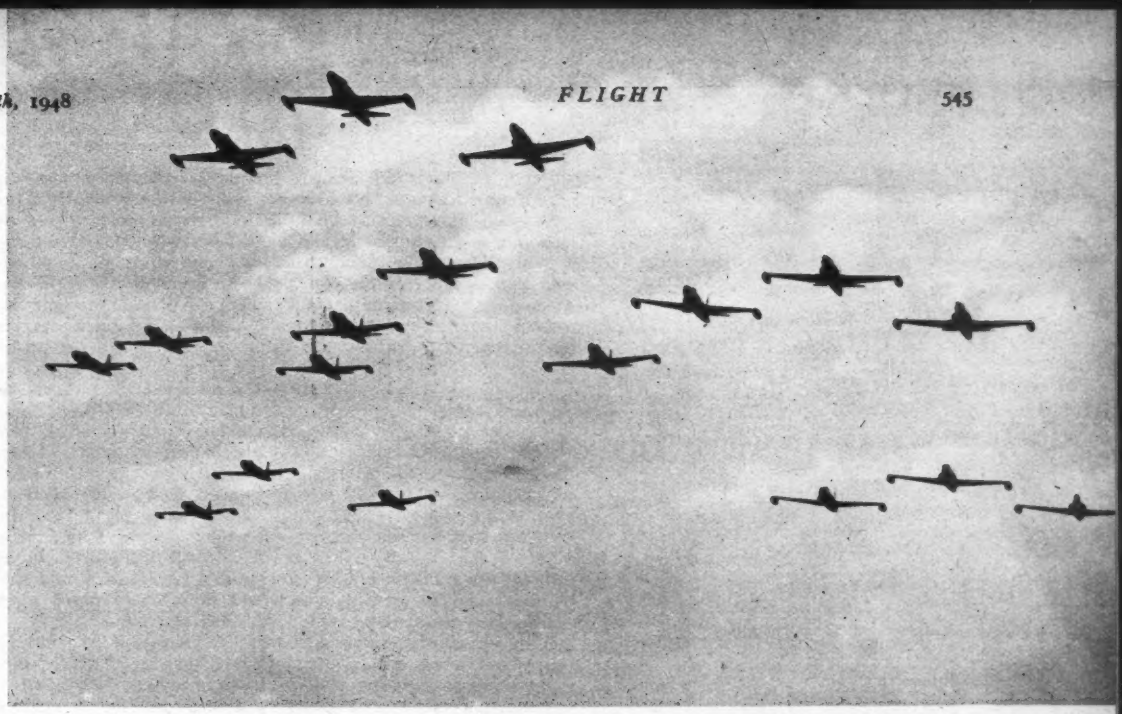
machines is equally certain. The tendency towards specialization is exemplified in the new interceptors; the escort, or "penetration," fighters; bomber-defence "parasite" fighters; night and all-weather fighters; and marine, or, more descriptively, water-based fighters. The interceptor is typically a single-seater, in which endurance is subservient to rate and angle of climb, ceiling and speed; it will generally have turbojet power with water injection, after-burning or auxiliary rocket boost. Pure-rocket interceptors, like the Me 163 of late war years, may be revived for the defence of specific targets.

Escort fighters present more serious design problems, for not only is long range demanded, but these aircraft, with more than half their heavy fuel load remaining, will be called upon to engage the enemy's lightly loaded interceptors. Single or twin-jet single-seaters will be preferred.

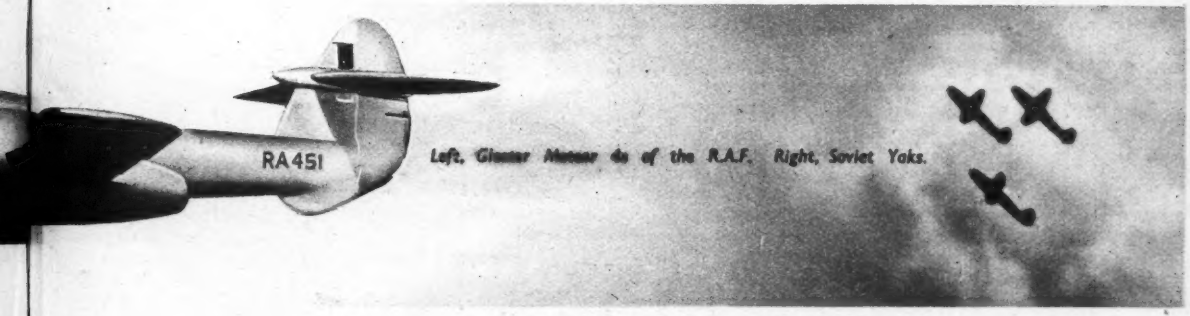
The bomber-defence fighter (if current tests with the McDonnell XF-85 "Parasite" warrant its continued development), will be a very small, light, single-jet machine suitable for internal, or semi-internal, stowage in the heaviest long-range bombers. An XF-85 can be carried in each of the three 16-ft bomb bays of the Brabazon-size Convair B-36.

For night and all-weather fighting a machine with twin turbojets, possibly with one of the auxiliary power systems mentioned for the interceptor, would appear to be ideal. Elaborately equipped with electronic aids and anti-icing gear, such fighters will carry a crew of two or three and will be suitable for "intruder" operations.

The water-based fighter, exemplified by the British Saunders-Roe S.R./A1, is characterized by unique operational flexibility.

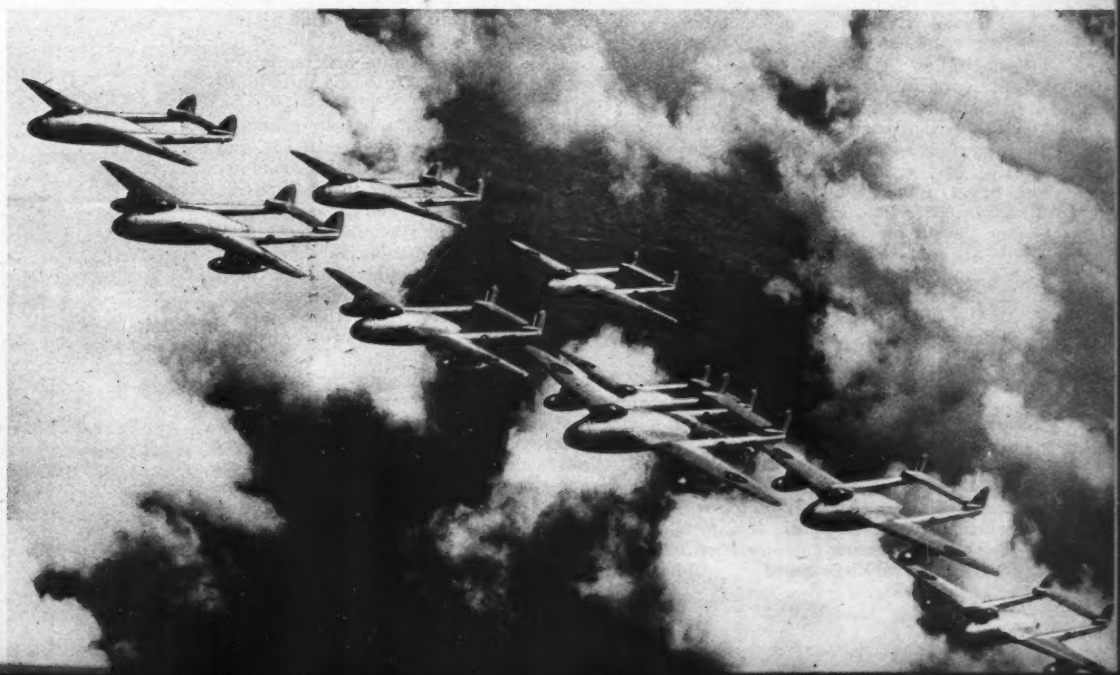


U.S.A.F. Lockheed Shooting Stars. Over 1,000 have already been delivered.



Left, Gloster Meteor 4s of the R.A.F. Right, Soviet Yaks.

De Havilland Vampire 3s of No. 54 Squadron, six of which flew the Atlantic last July.



Land-based and carrier-borne fighters will hereafter be jointly considered, for their operational functions will remain essentially similar. The detail design of Naval types will, however, continue to be affected by special take-off and landing considerations, field of view over the nose, stowage, and provision of assisted take-off and deck-arrester gear.

While aerodynamic and structural techniques as applied to fighters will be increasingly influenced by experience with high-speed research machines, the remarkable fact must be recorded that the world's fastest turbojet aircraft has proved to be a standard fighter, carrying its armament of six 0.5in guns and full ammunition. The record-breaking type concerned (North American F-86) is in quantity production for the United States Air Force and has shown itself, in recent flights, to be capable of sea-level speeds above 670 m.p.h. Previously the record stood to the credit of the U.S. Navy's Douglas D-558 Skystreak, a pure research aircraft totally unsuited for development as a fighter. To the F-86 goes the additional credit of being the first service aircraft to achieve supersonic flight, an apparent Mach Number of 1 having been attained some months ago in a dive at high altitude. Under similar circumstances, our own D.H.108 has likewise exceeded the speed of sound. It is unofficially reported that the F-86 has bettered Mach 1 in level flight at 30,000-40,000ft; an achievement of much greater significance, and one shared only by the rocket-powered, air-launched Bell X-1, reputed already to have reached Mach 1.4 (equivalent to a speed of 1,100 m.p.h.).

A major contribution to the speed of the F-86 is made by 35-degree swept-back wing and tail surfaces, the benefits of which, in delaying the rapid increase in drag at high Mach numbers, were first exploited by German designers. The advantages of swept-back wings are, unfortunately, conferred only at the expense of slow-speed handling qualities.

Martin-Baker supersonic fighter project.

Hawker Sea Fury of the Royal Navy.

FIGHTERS . . .

Inherently poor tip-stalling characteristics are aggravated by a drift of the boundary layer towards the tips. To prevent tip-stalling, the North American fighter (like the D.H.108) has leading-edge slats and, with the object of controlling boundary-layer drift, two new McDonnell "swept-back" fighters—the XF-85 Parasite and the XF-88 penetration fighter—have chordwise fins or "stall vanes." Recourse to boundary-layer control by blowing or sucking at the wing-tips seems likely to be introduced on fighters of the future.

The swept-back plan-form will become increasingly common on what are generally termed transonic fighters, i.e., those designed for Mach numbers between 0.85 and 1.05, and will be used in conjunction with a swept empennage. No British examples are yet in being, but Hawker Aircraft, Ltd., are known to be working on the E.38/46, a "swept" development of the P.1040, while the Supermarine works are engaged on the development of the Attacker along similar lines. Horizontal tail surfaces may be abandoned in certain fighter designs from which extreme manœuvrability is not demanded. The first—and up to the present, the only—"semi-tailless" fighter built to this formula was the German Me 163 rocket-propelled local-defence interceptor. A similar layout may be seen in the D.H.108. Truly tailless fighters (other than the "delta" designs later considered) are represented by the unsuccessful Northrop YP-79, now abandoned, and by the Chance-Vought XF7U-1, reported to have a 35-degree sweep-back at 25 per cent chord, and to be fitted with wing-tip fins.

Nowithstanding the apparently safe attainment of supersonic speed by the "108" and F-86, some formidable control problems are likely to be presented if the transonic fighters are to manœuvre effectively at velocities near that of sound. Unless very powerful aileron control can be provided, sweep-back may inflict heavy penalties on the rate of roll, and the ailerons, no less than the rudder and elevator, must receive special study. Another factor which threatens to affect control and stability, and which may, in particular, lead to aileron reversal and flutter, is structural distortion, the most dangerous manifestation of which is wing twisting.

Transonic fighters in general will have wings of low thickness-chord ratio with skins

Specialization to a high degree is illustrated by Northrops' two-seat "all weather" XF-89.

of heavy gauge, the latter being advantageous from the aerodynamic as well as the structural standpoint. In certain instances, as in American research aircraft, the skin may be machined to contour. Typifying current structural development is the experimental magnesium-zirconium alloy wing developed for the F-80 Shooting Star, which though weighing about as much as a normal F.80 mainplane, has a skin of exceptional thickness, for which remarkable rigidity is claimed. Torsional rigidity is attained in the F-86 wing by the use of "sandwich" construction, the structural material being laminated between inner and outer tapered skins. The Vought Pirate is largely constructed of Metalité—a sandwich of balsa wood between two sheets of metal.

Swept or unswept wings of low aspect ratio may yet prove efficient for certain types of supersonic fighter, but these have yet to demonstrate their superiority to the "delta," or triangular, plan-form, as advocated by Lippisch. Particular advantages promised by the delta form are elimination of the undesirable tip-stalling characteristics of conventional swept-back surfaces, and structural convenience. The only British proposal for a "delta" fighter of which mention may be made is the Martin-Baker, represented by a model lately displayed at Farnborough. Unlike the Lippisch projects, the wing in this instance is relatively thin.

No radical departure in fuselage design is likely to be called for in the transonic fighter class. The ultra-slim configuration which is patently desirable remains an ideal, full realization being generally prevented by power plant and tankage considerations, and by hesitancy in adopting a prone piloting position.

Aerodynamic requirements of the more distant future remain indeterminate, and it comes as no surprise to learn from America that the U.S.A.A.F. are pondering no fewer than sixty Douglas design studies for the X-3 supersonic research aircraft, of which a Mach Number of 3 and operational heights of the order of 300,000ft are demanded. Proposals are reported to range from "stubby, blunt-nosed designs to long, slender fuselages with sharp, bullet-like nose and tail."

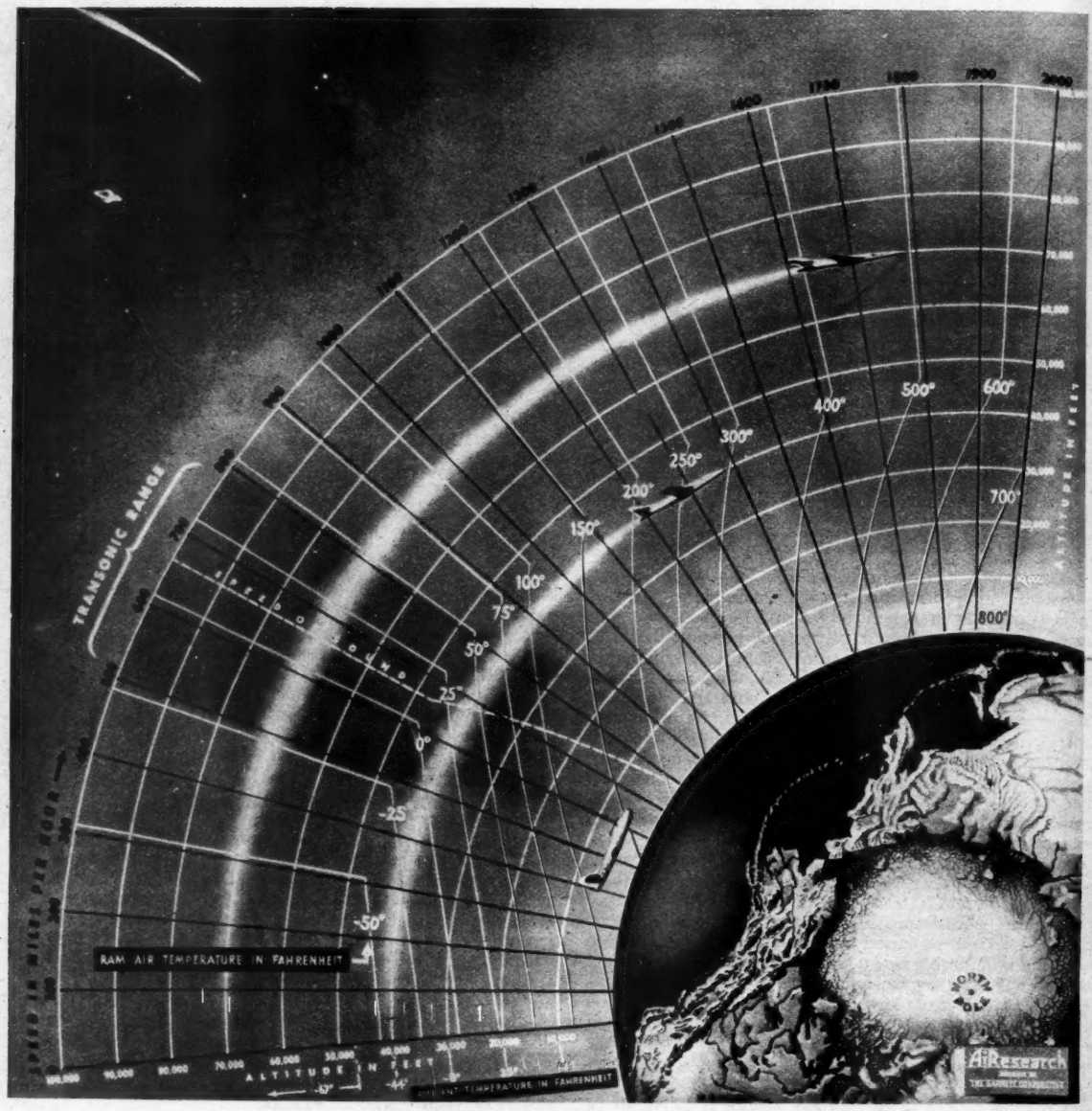
That poor surface finish and coarse manufacturing limits can prove seriously detrimental to the handling and performance of high-speed fighters is witnessed by the instance of the earlier Lockheed Shooting Stars quoted by Mr. Clarence L. Johnson in his classic monograph "Development of the P-80A Jet Fighter Airplane." On some machines, formation of wing shock waves led to a marked rolling tendency before any longitudinal pitching set in; others of the same production batch would go to higher Mach numbers and develop a gradual nose-down pitching moment. Especially noticeable was the great decrease in critical Mach number on a P-80 which, having encountered heavy rain at high speed, had incurred severe pitting of the leading-edge paint. A strong diving tendency was experienced at a Mach Number 0.10 below that common for the type. Thus can fighting qualities be seriously impaired by what might appear relatively trivial considerations.

Very necessary fitments on all modern jet fighters, aerodynamic braking surfaces can be applied to the wing (e.g., Meteor, Vampire and N.7/46) or fuselage (Shooting Star, Thunderjet and F-86). Though their incorporation presents peculiar structural problems, results have generally been excellent. The Meteor, for example, can be put into a 70-degree dive at 32,000ft with the turbojets running at 97 per cent of maximum r.p.m., and a descent made to 4,000ft in about 1½ minutes, without exceeding design limitations. Deceleration produced by closing the throttles and opening the brakes reduces speed to about 0.6 of that due to gravity at 400 m.p.h. Good performance is likewise claimed for the fuselage brakes of the F-86, which are said to restrict the diving speed to little more than 350 m.p.h. When it is recalled that the F-86 has been dived, with brakes retracted, at supersonic speed, the merit of this performance will be evident.

Another of the vexing difficulties which beset the jet-fighter designer is the disposition of the undercarriage. Partial solutions to the stowage problem are afforded by multi-wheel units and high-pressure tyres. Certain designs, e.g., the Swedish SAAB 29, call for a fuselage stowage, thereby encroaching further on the already replete interior of the body. On "swept-back" machines, such as the F-86, the wing-tips of which may be well aft of the centre of gravity, the undercarriage track is restricted by the necessity of mounting auxiliary fuel tanks well inboard.

The wartime Me 163 demonstrated the possibilities latent in jettisonable wheels and a landing skid—a scheme which appears to offer a reduction in weight and drag, greater fuel capacity, more efficient turbojet ducting, and increased structural stiffness, in addition to eliminating the stowage problem. Carrier-borne fighters, as proposed by Mr. W. S. Farren, might benefit from the transference of the shock-absorbing mechanism from the aircraft to the deck. By virtue of this innovation the resulting aircraft might prove superior to their land-based counterparts.

(To be continued)

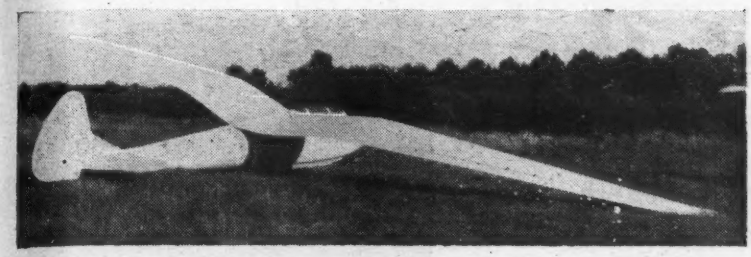


THE FASTER THE HOTTER

THE cleverly devised graph which we reproduce was recently published by the Airesearch Mfg. Co., of Los Angeles. Intended to show the temperature rise consequent upon air speed at varying altitudes, the temperature curves are said to have been computed on the following basis: the temperature at any altitude and speed is the sum of the Standard Army Summer Day temperature at that altitude and the ram temperature rise for the given speed. Ram temperature rise in degrees F. is found by dividing the true air speed in m.p.h. by 5,650.

We do not know how the American Standard Army Summer Day temperature scale compares with the I.C.A.N. temperature scale, which is normally taken as the international standard for performance calibration; but it may be seen from the graph that the tropopause is given at about 47,000ft instead of the normally accepted standard of 36,000ft. This, however, is not a critically important point, and would affect the intersection points of the temperature curves in minor degree only.

The real import of this matter is, of course, the problem of coping with the large temperature rise due both to ram compression and skin friction at the higher air speeds. Mr. Garrett, president of Airesearch, expressed the effects of the problem: "In to-day's high-speed jet planes the cockpit temperature would rise to at least 165 deg. if it were not for a new method of refrigeration." The new method of refrigeration referred to is the Airesearch air-cycle turbine cooling unit which, weighing less than 16 lb, is said to produce 4.2 tons of refrigeration. One ton of refrigeration is equivalent to dissipation of the heat required to melt one ton of ice at 32 deg F. in 24 hours (in this instance, the American ton of 2,000 lb applies).



Beauty of line is combined in the Castel-Mauboussin Adour with high aerodynamic efficiency (Max.L/D 26.5).

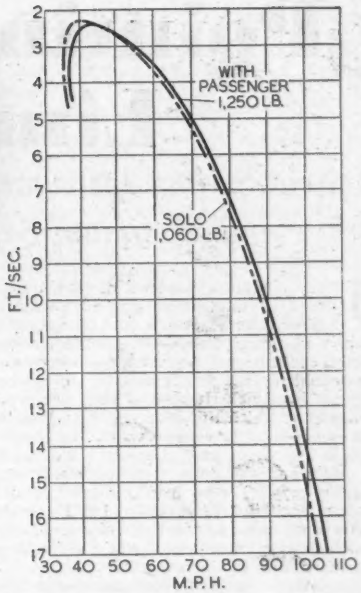
THE ADOUR

New French High-efficiency Two-seater Sailplane

DESIGNED by the project department of Etablissements Fouga et Cie, at Toulouse, and built at the firm's works at Aire-sur-Adour, the Castel-Mauboussin CM 7 Adour made its first flight on July 28th, and the next day it was demonstrated for an hour and a half to a representative of the Service Technique, piloted by M. Leon Bourrieau, the Fouga test pilot. Evidently the designers' calculations had been accurate, and the glider was satisfactory from the very beginning.

The Adour is the first French high-efficiency two-seater glider, and an order for it has been placed by the Service Technique. As a two-seater it can be used for instruction, and in view of its very complete equipment it is suitable for instruction in night flying and blind flying under the hood, as well as in aerobatics (it is stressed for a factor of 12).

Tandem seating is employed to facilitate blind flying under the hood, but in spite of this, the second pilot has a very good view, being in line with the leading edge of the wing. In addition to the usual anemometers, variometers and altimeters, cockpit equipment includes electric turn indicators, transverse and longitudinal inclinometers, compasses and clocks. Provision has also been made for installing oxygen equipment for high-altitude flying. The Adour is of wood construction and, as will be seen from the photograph, is a very handsome gull-winged glider of high aspect ratio (14.55). In addition to the landing skid there is a single-wheel undercarriage, the wheel being fitted with brakes. Launching can be by winch, bunjie or by aircraft tug.



Rates of descent of the Adour at various forward speeds.

Main dimensions of the Adour are: span, 59ft; length, 27ft 9in; height, 7ft 4in; wing area 239 sq ft. The empty weight is 852lb, and the disposable load 398lb, giving a maximum loaded weight of 1,250lb, and a wing loading of 5lb/sq ft. That the term high-efficiency glider is merited is shown by the fact that the maximum L/D ratio is 26.5.

Sinking speeds at various forward speeds are shown in the curves, from which it will be seen that the minimum is about 2.4ft/sec at 42 m.p.h. The speed corresponding to the smallest gliding angle is 48.5 m.p.h. Maximum diving speed, using the air brakes, is 171 m.p.h. When towed by an aircraft tug, the most comfortable speed is 68 m.p.h. Minimum speed is 37 m.p.h.

STILL GOING STRONG

MANY of our older readers will remember W/C. R. Vaughan-Fowler, who was at one time managing director of the Far East Aviation Co. of Hong Kong, and who now represents several British firms, including Avros (Manchester and Toronto), Armstrong Whitworth and Air Service Training. In addition he has other aviation interests in the Far East. During the war he closed down his business and joined the R.A.F., becoming Senior Aerodrome Officer for all India. In that capacity he laid out some 200 Service airfields. After the war he returned to Bombay, and eventually took up residence in Rajkot, which is more convenient and has a better climate. Old friends can get in touch with him at Ojha Bungalow, Koelawadi Junction Plot, Rajkot, C.S., Kathiawar, India.

KAMAN PROGRESS

THE Kaman K-190 utility helicopter described in *Flight* of August 26th, 1948, is expected to get its C.A.A. certificate this month. The major tests have been completed, and the firm's test pilot is now hard at work at Bradley Field, Connecticut, accumulating the "lead time" required by the C.A.A. For a time he was flying the machine from 8 a.m. to 4 p.m. seven days a week, landing only for refuelling and periodic inspection. The fact that a pilot has been able to do this speaks well for the ease of control of the K-190, which, it may be recalled, has twin intermeshing rotors and pitch control by means of servo-control surfaces on the blades. A rotor and its controls have been delivered to the U.S. Navy and are to be further tested at the N.A.C.A. laboratories at Langley Field, Virginia.

SEVERN BRIDGE TUNNEL TESTING

AN investigation into the aerodynamic behaviour of suspension bridges, with particular reference to the design of the proposed Severn Bridge, has now reached the stage when experiments are about to be started on a complete model bridge in the specially designed wind tunnel at Thurleigh, Bedfordshire. The research work is under the direction of Dr. R. A. Frazer, F.R.S., of the Aerodynamics Division, N.P.L. The consulting engineers for the design and construction of the bridge are Messrs. Moss, Hay and Anderson, with whom are associated Messrs. Freeman, Fox and Partners.

Although many early suspension bridges were damaged or destroyed by wind action, the serious study of the aerodynamic oscillations of bridges dates from 1940, when the 2,800-ft span of the Tacoma Narrows bridge in the U.S.A. broke under torsional oscillations.

For the Severn Bridge investigations, the model now under test has a centre span of 30ft and a total length of over 50ft. Constructed of light, rigid components, with steel interconnecting springs adjusted to give the necessary overall elastic stiffness, it offers wide scope for variations of structural form. For tests of the full model bridge, a wind tunnel was needed having a top speed of 20 ft/sec (corresponding to 136 m.p.h. on the actual bridge) and incorporating a "test room" 60ft square in plan and 7ft high. The bridge model is mounted on a turntable sunk flush with the tunnel floor, allowing tests at any angle of yaw to be made. A suitable areodynamic design for the tunnel was decided by experiment with a model at the N.P.L., and the actual tunnel was structurally designed and built by the Bridge Section and Eastern Engineering Division of the Ministry of Transport.

Pointing the Limit

A New Smiths Instrument to Show Actual and Maximum Safe Air Speed

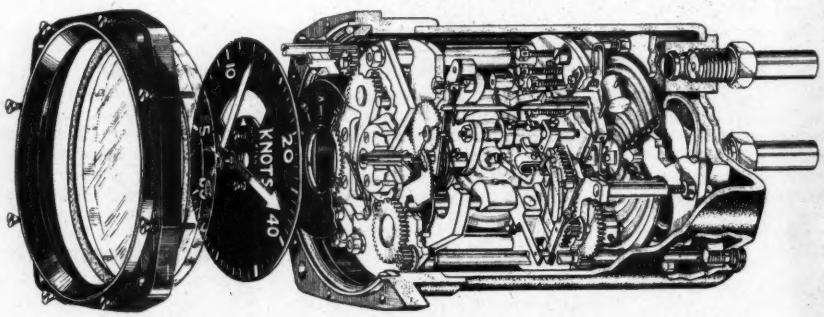
Here is shown the single-sweep dial calibrated in knots, the I.A.S. and S.A.S. pointer forms, and the window for Mn setting.

THAT flight at speeds approaching that of sound can involve unpleasant and, in some instances, actively dangerous reactions on the aircraft is now very well known, and to give the pilot some indication of how close to the critical speed he may be flying, machmeters have been developed. These instruments do not indicate air speed as such, they merely indicate the Mach Number, that is, the percentage of the speed of sound at which the aircraft is flying, at the obtaining height. For example, if the aircraft was flying at 540 m.p.h. at 16,000ft., it would be flying at 75 per cent. of the speed of sound at that altitude, and the pointer of the machmeter would indicate a value of 0.75. The air speed indicator cannot well be eliminated from aircraft instrumentation, but the installation of a machmeter does encroach on the space available in the instrument panel. Furthermore, the pilot has to memorize the limiting Mach Number of the aircraft.

To obviate the extra instrument, and to contribute to easing the pilot's job, Smiths Aircraft Instruments Ltd. have developed a maximum safe air speed indicator which, in addition to providing the ordinary I.A.S. information of the conventional indicator, also tells the pilot the maximum speed for which the particular type of aircraft is cleared.

Although the instrument may be obtained calibrated in m.p.h., knots or k.p.h., and in 1 and 1½ sweep versions the method of presenting the information is essentially common to all: actual air speed is indicated by a conventional pointer, but the maximum safe air speed is indicated by a second pointer shaped with a broad arrowhead. So long as the pilot does not allow his speed to mount to such a point that the I.A.S. needle overlaps the S.A.S. needle, the aircraft will be kept within the safety range. It is as simple as that.

The cut-away drawing illustrates the somewhat complicated viscera of the instrument, but to aid understanding of the basic movements, a conventionalized diagram is also given. At the rear of the instrument is the beryllium-copper capsule which actuates the I.A.S. pointer through an orthodox multiplying mechanism. This capsule, incidentally, is brazed, and the manufacturing technique is such that the capsule is virtually without histeresis and is capable of withstanding an overload equivalent to 800 m.p.h. without damage. Capsule movement equivalent to a speed range between 40 and 150 knots is unrestrained, but beyond the 150-knot point, movement is governed by a calibrating spring. This permits of an open-scale calibration up to 150 knots to facilitate accurate low speed reading.



With the upper part of the case cut away to ease portrayal, the complex intestines of the instrument can here be discerned. The viewpoint is approximately 90 deg. to that of the diagram on the facing page, with which the above drawing may conveniently be followed. The connections at the rear of the case are for top, static pressure and, bottom, dynamic pressure.

Before going on to describe the safe air speed movement of the instrument, we might with advantage first consider the basis upon which this element operates. It can be stated that, if the height at which the aircraft is flying is known, then the speed of sound at that height is also known. (The capsule must be calibrated to some standard scale—usually I.C.A.N.—and this scale will incorporate a temperature gradient relative to the pressure and density gradients.) Thus, by using an aneroid capsule to actuate the safe air speed pointer, the desired end can be achieved. However, the use of an ordinary I.A.S. scale of indication does introduce difficulties in that it means that the aneroid capsule must be so designed that its expansion/contraction characteristics conform to the dial scale used.

Although the speed of sound in air is dependent solely on temperature, for purposes of instrumentation an indication of Mach Number can be given by the difference in dynamic pressure and static pressure expressed as a ratio of absolute static pressure. The formula for giving dynamic head is:

$$\text{(i)}\quad p_1 = p\left(1 + \frac{(\gamma-1)\rho v^2}{2\gamma p}\right)^{\left(\frac{\gamma}{\gamma-1}\right)}$$

where p_1 = absolute dynamic pressure
p = absolute static pressure
γ = ratio of specific heat = 1.4 for air
ρ = density
v = velocity

This formula is usually expanded in the form:

$$\text{(ii)}\quad p_1 - p = \tfrac{1}{2}\rho v^2\left(1 + \tfrac{1}{4}\frac{v^2}{a^2} + \ldots\right)$$

where $a^2 = \frac{\gamma p}{\rho}$ and a = velocity of sound

However, (i) can also be rearranged and written:

$$\text{(iii)}\quad p_1 = p\left(1 + 0.2\,\frac{v^2}{a^2}\right)^{3.5}$$

letting $\frac{v^2}{a^2} = M^2$ where M = Mach Number

This is expanded by anomaly thus:

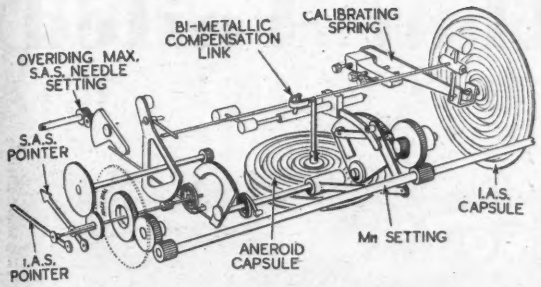
$$\text{(iv)}\quad p_1 = p(1 + 0.7\,M^2 + 0.175\,M^4 + 0.0175\,M^6 + \ldots)$$

which can be condensed as:

$$\text{(v)}\quad \frac{p_1 - p}{p} = (0.7\,M^2 + 0.175\,M^4 + 0.0175\,M^6 + \ldots)$$

It can be observed that in rearranging (ii) into (iii) ρ has been eliminated, and as this is the factor in which the quality of temperature is vested, the required result can be derived from pressure ratios alone. What it amounts to is that for the purpose of *indicating* Mach Number, the ambient temperature need not be considered, since the temperature factor is common to both pressures and thus cancels out, leaving Mach Number as the derivative of the pressure ratios.

The limiting safe speed for any given aircraft type will have been determined during its development-testing, and thus, when



From this schematic arrangement the operative movements of the instrument may be followed. Incidentally, the bi-metal link is of brass and invar, and its purpose is to compensate for the effects of temperature on the capsule characteristics.

the maximum safe air speed indicator is installed in the aircraft, the limiting safe speed is set into the instrument through a hole in the back of the case, which is then sealed. In making this setting, the value in terms of Mach Number is shown through a window in the instrument face, and a gear train from the setting bar appropriately sets the pivotal geometry of the linkage between the safe air speed pointer and the aneroid capsule. This linkage is nominally of parallel-action type, the contact between capsule and linkage being made through a curved cantilever arm on the capsule side and a follower-roller on the linkage. Once the setting has been made, there is only slight movement between the roller and the arm. As the aneroid capsule expands and contracts, the arm is lifted and lowered, so respectively decreasing and increasing the safe air speed indication according to change in altitude. The operation of this can be followed through the schematic diagram

It will also be seen in this drawing that an over-riding setting is provided at the front of the instrument for the safe air speed pointer. This is of considerable importance. It may well be that, although an aircraft can safely fly at a Mach Number of, for example, 0.85 at 30,000ft, its safe limit at sea level may be no more than 0.75 for, aside from flow distortion near sonic speeds, a further criterion of safety for the aircraft is really a matter of withstanding the applied forces. These are, however, basically affected by density and pressure, and it is in this disparity that the change in safe air speed *in terms of Mach Number* is evident.

Altitude and Indication

The hypothetical values we have quoted can be used to illustrate this. At 30,000ft, our Mach Number of 0.85 is equivalent to 580 m.p.h., whereas, at sea level, a Mach Number of 0.75 is equivalent to 574 m.p.h. At sea level in I.C.A.N. conditions of still air, and disregarding position error, etc., the I.A.S. will be the same as the T.A.S. However, at 30,000ft, a correction must be applied dividing the true air speed by 1.634 to give indicated air speed, which in this example is 355 m.p.h. Therefore, although the aircraft is moving through the (assumed still) air at a true speed of 580 m.p.h., the pilot will only see a speed of 355 m.p.h. indicated by his A.S.I. Conversely, if an aircraft climbs from sea level to an appreciable altitude at a constant true air speed, the indicated air speed will progressively diminish.

The over-riding setting for the safe air speed pointer is important in that the pointer has to indicate against an I.A.S. scale so that, in common with the I.A.S. pointer, it will, for a constant setting, move back as altitude is increased. Thus, following through our example, although the basic setting of the instrument is made at Mn 0.85, the S.A.S. pointer will nevertheless be set by the over-ride to a limit of 0.75. This will allow the aircraft to be flown at a T.A.S. of 574 m.p.h. at sea level and a T.A.S. of 580 m.p.h. at 30,000ft, by virtue of the fact that the I.A.S. pointer at the latter conditions will be indicating 355 m.p.h. and the S.A.S. pointer is affected by the same laws.

The tolerances of indicative accuracy called for in the specification are extremely severe. The S.A.S. pointer must indicate to an accuracy of $\pm$ 3 knots throughout the total performance range of the instrument, whilst the I.A.S. pointer must indicate to an accuracy of $\pm$ 2 knots up to 175 knots; $\pm$ 3 knots up to 430 knots; and $\pm$ 5 knots up to 650 knots. These tolerances apply equally in the metric and m.p.h. equivalent calibrations. The indicator is being produced both in civil and military versions, the respective weights being 18 oz. and 20 oz. A useful design feature is that, unlike most instruments using a front fixing in the case, the movement of this unit can be extracted without first removing the pointers and dial.

HILLER 360 CERTIFIED

WITH the granting of a full C.A.A. certificate, the Hiller 360 utility helicopter is now going into limited production at the Palo Alto works in California. The machine was described in *Flight* of January 8th, 1948, and is remarkable for the stability given it by its servo-control system (two aerofoil surfaces carried at right angles to the rotor blades). It is interesting to learn that quantity manufacure is not being undertaken by United Helicopters, who produce trainers and demonstration machines only, but that all major parts and assemblies are being manufactured by sub-contractors in different parts of the United States.

CITY AND GUILDS

AN advisory committee on aeronautical engineering practice, under the chairmanship of Sir A. H. Roy Fedden, M.B.E., D.Sc., has recently re-drafted the City and Guilds of London Institute scheme of courses and examinations for the practical aircraft apprentice. It is intended that the new syllabuses shall come into operation in technical colleges and schools in September, 1949.

In drafting the new scheme, the committee has borne in mind that the College of Aeronautics, Cranfield, and the Royal Aeronautical Society provide for the higher grades of scientific and engineering technicians in the aircraft industry. Nevertheless, the young mechanic must acheive his practical proficiency on the floor of the shop, and today the practical mechanic has, in addition, to possess a thoroughly sound technical knowledge if he is to be really proficient. The intention of the committee is that the new courses should provide the criterion of the standard required of the modern aeronautical mechanic.

On the grounds that a sound basic engineering training is an essential preliminary to a study of the more advanced field of aeronautical engineering, the course of instruction and related examinations in subject 63, Machine Shop Engineering, Intermediate Grade, of the existing City and Guilds syllabus (D) has been adopted as the intermediate stage of the scheme in aeronautical engineering practice. This intermediate course should occupy preferably three, but in any case, not less than two, years of part-time instruction. Candidates taking the Intermediate Grade of Machine Shop Engineering as the first stage of their studies for a qualification in Aeronautical Engineering Practice should enter for the Intermediate Examination in Machine Shop Engineering in the normal way.

In the final grade, separate courses of instruction are arranged in Section 72 A, Airframes, and 72 B, Power Plants. Each course should occupy at least two years of part-time study, and comprises Workshop Technology (airframes or power plants); Science, Calculations and Drawing (airframes or power plants); and Scheme of Practical Work (airframes or power plants).

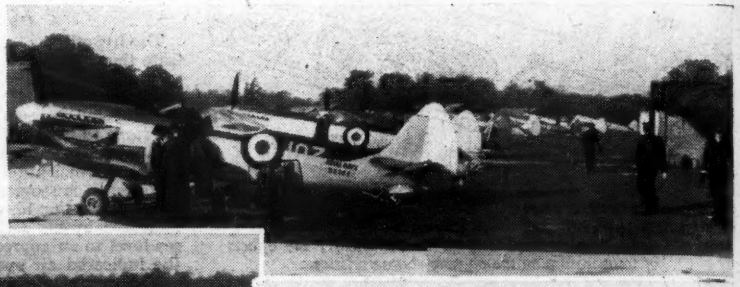
In order to be accepted for the examination, a candidate must, at the time of entry, be certified by the Principal of the college (which term includes a works school approved by the Institute) as having satisfactorily completed a final course in workshop technology, and science, calculations and drawing (or in science, calculations and drawing when no course in workshop technology is available) and satisfactorily to have carried out at least two of the sections of the scheme of practical work. In instances where a workshop practice course has not been taken at the college, the works manager may certify, through the Principal of the college, that two sections of the scheme of practical work have satisfactorily been carried out at the works where the candidate is employed.

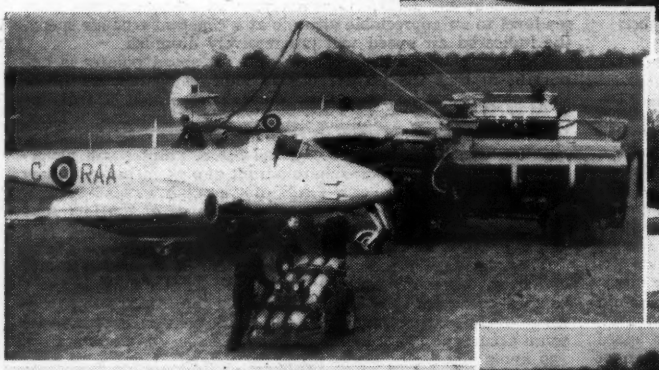
FAIREY AVIATION REPORT

IN the course of his speech at the annual general meeting of the Fairey Aviation Co., Ltd., Sir Richard Fairey, M.B.E., F.R.Ae.S., chairman and managing director of the company, emphasized the importance of research and development in such a progressive industry and said that to fall behind in technical progress would seriously damage the company's future prospects. Sir Richard continued by saying that when one reflected that such successful aircraft as the Fox, Swordfish, Primer and the Fairey helicopter had all been private ventures, conceived within the organization and financed with its own resources, it was a little bewildering to learn that it had been stated in the House of Commons from official sources that there was no such thing as private enterprise in the British aircraft industry. The firm had new and novel types in the prototype stage and on the drawing board, and their latest contribution to Naval Aviation would shortly take the air. Following successful pioneering efforts the company was being encouraged by the M.o.S. to extend its activities in the guided weapon field.

The Light That Failed

Fog in the London Area Robs R.N.V.R. and R.Aux.A.F. Squadrons of Opportunity to Take Part in Territorial Review





"*Flight*" photographs.

(Top) At Culham. The Seafires of No. 1832 R.N.V.R. Squadron ready for flight. (Centre left) Meteor 3s of No. 500 Squadron, R. Aux. A.F. are refuelled immediately upon returning to West Malling. (Centre right) Harvards of No. 1832 taxy past the Seafires of No. 1833 from Bramcote. (Bottom left) Despite their cheery expressions these pilots at Culham are breathing fire and brimstone on Air Traffic Control. (Bottom right) Some of the pilots and ground crew of No. 500 Squadron with their eight Meteors in the background.

AT the Territorial Review by H.M. the King in Hyde Park on Sunday last a number of R.N.V.R. and R.Aux.A.F. squadrons were to have taken part by flying in formation over the saluting base. Weather, however, made this impossible. A considerable fog persisted over London all day despite brilliant sunshine in the Home Counties.

One disappointing piece of news had already broken and another was in the offing when *Flight* arrived at the headquarters of No. 500 (County of Kent) Squadron of the Royal Auxiliary Air Force, at West Malling. The visit from six Vampires of the other jet fighter-equipped Auxiliary squadron —No. 605 (County of Warwick)—had been cancelled and the Vampires were now to join the main fly-past stream over Radlett; the fly-past itself was in danger of being cancelled through poor visibility, and although the sky over Kent was as bright as could justifiably be expected at the tail end of October, reports from London told of haze limiting vision to 200 yards, a dépressingly far cry from the required three miles. Under such circumstances, there was little surprise when the operation was finally called off at midday.

Local conditions were still suitable for flying, however, and after lunch F/L. Leggett, the squadron adjutant, in the absence of the Commanding Officer, S/L. Pat Green, led a formation of six of the Meteor 3s in local flying. They were airborne for a short time only, as the aircraft are not fitted with drop tanks, and when the main tanks had been replenished after landing the light had become decidedly poor.

Several of the Squadron's pilots served in Bomber, Coastal, and Transport Commands during the war, and had their first experience of fighters in the Mosquitoes which until lately equipped the Squadron; the conversion to jet fighters was accomplished surprisingly quickly and smoothly, and the pilots are very pleased with the handling and performance of the Meteor.

At Culham, near Oxford, where three R.N.V.R. air squadrons had forgathered for the fly-past, the weather was brilliant, and loud were the howls that went up against the powers that be, and Air Traffic Control in particular, for cancelling the flight. The younger element even suggested that the formation should take-off and lose its way in the air; just "happening" to arrive over Hyde Park at the right time.

However, it was finally decided to put the squadrons into the air and fly in formation over the surrounding countryside. The 12 Seafires, of varying marks, put up a most excellent display, showing the great amount of trouble which had been taken to make the formation a credit to the R.N.V.R. The cancellation was a severe disappointment.

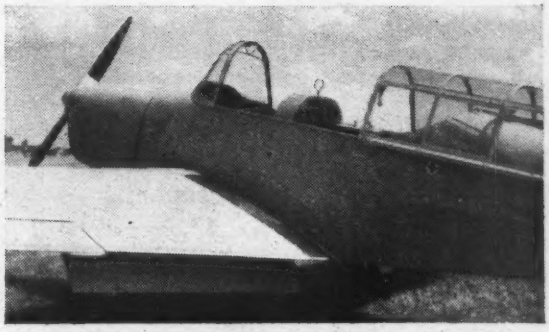
At the end of the flight the squadrons dispersed, each to its own base; No. 1831 to Stretton, No. 1833 to Bramcote and No. 1832 back to Culham.

CZECH TRAINER AND SAILPLANE

The Zlín 26 and Lunak L.107

SINCE the Communist *coup d'état* in Czechoslovakia little new information has been forthcoming regarding the activities of the Czechoslovak aircraft industry. However, details are now available of two new aircraft—the Zlín 26 basic trainer, built by the former Zlínske Letecke Zovody, of Otrokovice, for the Czechoslovak Air Force, and the L.107 Lunak single-seat high-performance sailplane, a product of the former Letov plant at Prague-Letnany.

The Zlín 26 was designed in competition with the generally similar Praga E.112, but as nothing has been heard of the latter since its first flight in September, 1947, it would appear that the Zlín has been chosen for production as the standard elementary trainer of the Czech Air Force. Design is on conventional lines, with pupil and instructor seated in tandem. Welded steel tubing is used for the fabric-covered fuselage. The wing centre-section main spar is welded to the fuselage, and carries attachment brackets for the outer main spars and undercarriage.



Sliding canopy on the Zlín 26.

ZLÍN 26

Dimensions	
Span	33.67ft
Length	24.57ft
Height	6.82ft
Wing area	159.36 sq ft
Flap area	14.32 sq ft
Weights	
Weight empty	1,124lb
Weight loaded	1,664lb
Performance	
Max. speed (s.l.)	130.5 m.p.h.
Cruising speed	115 m.p.h.
Landing Speed	48.5 m.p.h.
Initial rate of climb	672 ft/min
Ceiling	16,400ft
Range at cruising speed	375 miles
Climb to 13,120ft	35 min 45 sec
Take-off (with flaps)	175 yd
Landing run	142 yd

LUNAK L.107

Dimensions	
Span	45.93ft
Length	21.8ft
Height	4.82ft
Wing area	140.08 sq ft
Weights	
Weight empty	429.9lb
Weight loaded	650.45lb
Performance	
Gliding angle at forward speed of 49.7 m.p.h.	1 : 24
Max. sinking speed at 44.7 m.p.h.	2.78ft/sec
Sinking speed at 68.3 m.p.h.	5.4ft/sec
Optimum speed	62–74.5 m.p.h.
Landing speed	34 m.p.h.
Max. permissible diving speed	217.5 m.p.h.
" " " " with dive brakes	155 m.p.h.
" " speed with flaps down	74.5 m.p.h.
" " towing speed	155 m.p.h.

An auxiliary spar in each half of the centre section is directly attached to the fuselage by brackets. Electrically-operated flaps have a travel of 60 deg., and may be set at any intermediate position. Oleo-pneumatic shock absorbers are incorporated in the main undercarriage and tail wheel and the hydraulic brakes, and in common with other controls, may be operated from either seat.

Power is supplied by a four-cylinder Walter Minor 4-111 inverted in-line air-cooled engine, rated at 105 b.h.p. at 2,500 r.p.m. Hand-cranking starter gear is employed.

It is claimed for Lunak's attractive-looking L.107 that its handling qualities are exceptional, and that it is capable of performing all aerobatic manœuvres, the ultimate load factor being 12.5. Stringers and frames of pine-wood, covered by birch plywood skin, make up the oval-section fuselage. The high-aspect-ratio wing is constructed in two sections. Dive brakes are fitted and the flaps are linked with "drooping" ailerons to reduce landing speed without any serious loss of aileron control. With the exception of fabric for the control surfaces, plywood skin covering is employed throughout.

The cockpit of the Lunak L.107 appears unusually spacious.

PEST CONTROL IN THE SUDAN

FOLLOWING the first successful experiments in spraying cotton crops in the Sudan from the air which took place during October, as reported in *Flight*, October 21st, Pest Control, Ltd., have started large-scale operations on the contracts which they have in hand for the destruction of the Jassid, a small insect which damages cotton crops in that area.

The first short test flight was made with an air temperature reading of 102 deg F, and the Westland Sikorsky S.51 helicopter rose more sluggishly than it does in the United Kingdom. The next test was carried out early in the morning, when the air temperature was 92 deg F., and at this temperature a full load was lifted. Analysis of numerous flight trials near Khartoum showed that owing to the great heat the air density in that region, although its altitude is only 1,200 feet a.s.l., is equal to an air density at 4,500 feet over England. For this reason the aircraft did not lift a full load after 10.30 a.m.

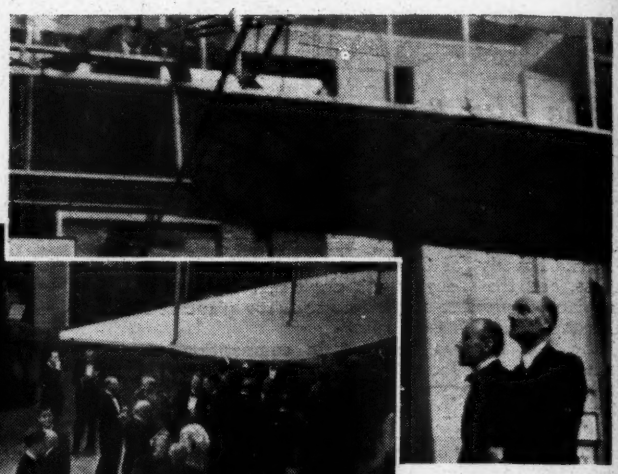
The Westland-Sikorsky S.51 has been fully tropicalized and special dust filters fitted. Heat-insulating covers were provided for the rotor blades to protect them against extreme heat while standing in the sun. On completion of the aeronautical tests, spraying trials were commenced on crops of the Sudan Plantations Syndicate. The aircraft gave a very good performance, and when the mortality of the cotton pests was assessed it showed results equal to those achieved by tractor-driven power-spraying machines.

As soon as spraying trials commenced, the biggest danger to helicopter-spraying in the Sudan became apparent: Birds feeding in the crops flew out when the helicopter was overhead and were struck by the rotor blades. Mr. Harper, Pest Control's Chief Pilot, observed that the smaller birds proved little hindrance, but the vultures soared upwards making no attempt to avoid the aircraft. Another danger to low-flying helicopters are the dust clouds which obscure the ground. When landing, the dust raised by the downwash from the rotor was sometimes found to obscure the pilot's downward visoin.

TECHNICIANS RELAX

Highly Successful R.Ae.S. Conversazione at "South Ken"

Illustrated with "Flight" Photographs



(Above) Sir Geoffrey de Havilland (right) and Mr. M. J. B. Davey, Curator of the Science Museum, looking at the newly installed replica Wright biplane. (Left) The guests gathered beneath the Wright aircraft.

MEMORIES of the very early days of flying were revived at this year's Royal Aeronautical Society Conversazione, held in the Science Museum, South Kensington, last Friday. Shortly before the beginning of the Society's annual social event, a small ceremony was held at which S/L. R. W. Reeve, D.F.C., A.F.C., M.M., Principal of the de Havilland Aeronautical Technical School, officially handed over to Mr. M. J. B. Davey, Curator of the Science Museum, the replica of the original Wright biplane which has been built by apprentices of the school, and which has now taken the place of the original Wright, now on its way back to Washington, as recorded in *Flight* last week.

The handing-over ceremony was also attended by Dr. Roxbee Cox, president of the R.Ae.S., and by Capt. J. Laurence Pritchard, the society's secretary, as well as by Sir Geoffrey de Havilland and Mr. F. T. Hearle. It was particularly appropriate that boys of the D.H. Technical School should build the replica of this famous biplane, for Sir Geoffrey de Havilland was one of the earliest British pioneers, and his co-director, Mr. Hearle, was associated with him in the building of the very first D.H. biplane in 1909-10. Let it be said at once that if Orville Wright had been alive and could have seen the replica, we feel sure he would have approved the fidelity with which lads of 1948 have copied his biplane of 1903.

Another "link with the past" was formed by a series of cinematograph films shown during the evening. Photographically they were open to criticism, due to the fact that the infancy of the art of cinematography was pretty well contemporary with that of flying, and because the speed of taking was then lower than that used nowadays, but historically they were fascinating. It must have been instruc-

(Left) Mrs. Uwins, Mrs. Wingfield, Capt Cyril Uwins and Lawrence Wingfield. (Bottom Left) Robert Perfect, Mrs. Scott-Hall, Mrs. Perfect and Stewart Scott-Hall. (Below) Lady Fedden, Sir Roy Fedden, Lord Sempill, Sir Frederick Handley Page and Sir Archibald Rowlands.

(Top) Mr. Davenport and Mrs. W. G. Perring. (Centre) The guests take refreshments with the history of locomotion as a background.

(Top) Sir Arthur Gouge with his daughter Margaret. (Centre) Gordon England and Mrs. England chatting with Dr. Thurston. (Bottom) Sir Alan and Lady Cobham.

(Top) Mr. J. Fearn and his daughter Kathleen. (Centre) Mr. and Mrs. John Lankester Parker. (Bottom) Mr. and Mrs. F. F. Crocombe partake of a cup of coffee.

tive to the younger generation to see some of the quaint contraptions with which early French and American experimenters struggled to master the air.

A relatively little-known piece of British aviation history was recalled by the film of the Cedric Lee circular-wing monoplane, shown and commented upon by Mr. G. Tilghman Richards, who designed it. It was flown on many occasions (and once crashed) by that amazing character of the early days, Gordon Bell. As Mr. Tilghman Richards said during his commentary on the film, that machine was the genuine and original "flying saucer." It did not stall or spin, and could fly extremely slowly, although this ability could not be fully utilized in landing, owing to the very large angle at which maximum lift coefficient was attained.

Group Captain Liptrot put present-day helicopter flying into its proper perspective by showing films of most of the early attempts. He paid a well-deserved tribute to the late de la Cierva for his pioneer work in the rotating-wing field, and traced the evolution of the helicopter from the earliest days up to the first successful Sikorsky of recent times. The films attested to the fact that control has been the great difficulty. Many of the early helicopters, though not all, would lift; the trouble started when they left the ground and had to be managed. But gradually the length of hops increased, the first really practical helicopter being the twin-rotor Focke-Achgelis. Control problems can now be said to have been reasonably well solved, the task now before helicopter designers being mainly one of achieving stability and reducing production costs.

The Conversazione itself was a great success. A great number of the technicians from the aviation world were there with their wives, and during the latter part of the evening, until midnight, there was dancing for the younger folk, in which many of the not-so-young took part. Altogether the evening demonstrated that the august Royal Aeronautical Society enjoys an occasional break in its struggle with modern aircraft problems.

R.Ae.S. DISCUSSES PRODUCTION

"SOME Developments in Aircraft Production" was the subject of last Thursday's R.Ae.S. paper, read by Mr. H. Smith (works manager, Handley Page, Ltd.) in the absence, through illness, of Mr. D. C. Robinson, works superintendent.

The subject is, of course, a complex one with only vaguely defined limits, and the author probably did right to confine himself to a general outline which would be appreciated by those not intimately concerned with the manufacture of aircraft. Understandably, his viewpoint was that of one responsible for a particular manufacturing policy, and he therefore devoted a considerable proportion of the paper to an explanation of the system favoured by Handley Page, Ltd., whereby accurately tooled details make final assembly of the airframe a process which can be carried out "on the floor" rather than in elaborate fixtures. This method is one which, having proved notably successful in the Hampden and Halifax, has been extended in somewhat modified form to the Hastings and Hermes.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

AIRCRAFT UTILIZATION

Passengers' Requirements Should Come First

MR. PETER MASEFIELD'S lecture before the Royal Aeronautical Society, as reported in *Flight* recently, must rank among the most instructive and informative yet given in throwing constructive light on the future of civil aviation.

He would, however, appear to subscribe to the failing prevalent in the set-up we have to-day—aircraft utilization.

The travelling public are not interested in the number of hours flown per year by each aircraft. Their interest lies in having a service run at convenient times to suit their requirements. Thus we now have aircraft flying routes with less than 30 per cent passenger loads, due to schedules so inconvenient that these services are being withdrawn through lack of support. Place "passenger requirements" before "aircraft utilization" and, though this may result in fewer services, they will at least be fully patronized and at the same time carry out the charter of "serving the public."

Aberdeen. "INCONVENIENCED."

GEE-LESS FLIGHT AT 18,000 M.P.H.

Why Not Inverted at 25,000 m.p.h. ?

MR. MASEFIELD'S masterly paper on civil aviation trends of development, in which he summarizes his conclusions under the sixteen points, contains one forecast, point 10/f, which seems to me to be open to question as being too pessimistic. It is that the rocket projectile as the ultimate peak of high-speed transport will have intra-terrestrial speeds of up to only 18,000 m.p.h.—"to anywhere on the earth in the hour."

When exploring this question recently, I at first came to the same conclusion, which I based on the fact that at approximately this speed centrifugal force, arising from flight in a curved path around the earth, counter-balances gravity (see the moon). In other words, it would be equivalent to flight at no g. Greater speeds result in centrifugal force winning, and the machine escapes from the earth.

On the other hand, if the machine is flown upside-down, flight at the equivalent of minus 1 g is possible without escape when the approximate speed is 25,000 m.p.h., and under these conditions the net forces on wings and passengers would be plus 1 g in the normal direction; a state of affairs for which both aircraft and passengers are usually designed.

This would not necessarily involve a slow roll or half-loop at 18,000 m.p.h. because, if sufficient power is available to achieve these speeds and necessary altitudes, a near-vertical initial ascent would be possible with an approximately elliptical flight path or trajectory to give a constant net acceleration of 1 g outwards from the earth. This, with the machine inverted at the completion of the ascent, would be experienced as a constant acceleration of 1 g in the normal direction.

Flight upside down at 25,000 m.p.h. would then feel perfectly normal, and even the view UMOP from the windows would be in the usual direction but, instead of seeing the cloud-blanketed earth, the day or night panorama would be a vast blackness (due to the rarified air) brilliantly patterned with stars shining more brightly than we have ever seen. In fact, it will be a case of home by the Great Bear instead of the Great West Road.

A complete power failure when flying like this at a speed which is much greater than the escape velocity might also be a case of having to pick your star instead of your field, but, given normal control, this could be left to the discretion of the pilot.

Quite apart from the increase in speed made possible by the expedient of flying upside-down, it is obviously preferable to flying at no g when all sorts of problems affecting the comfort and convenience of the passengers would arise. It is not difficult to imagine, for instance, what would happen in the dining room, lavatory or galley: Really Mr. Masefield! what will happen at no Gee?—words for a new song:—

What will happen at zero Gee?
Oh dearie me, oh dearie me,
Enough of this hilarity,
Give me a little Gravity.

Apologies for this; it must be the rarified air. Where did we get to?, oh yes, 25,000 m.p.h. upside-down. Round the earth in an hour, not—to anywhere on the earth in the hour, as Mr. Masefield forecasts so pessimistically. Is it a mere coincidence that the earth was made of the correct diameter to give this result, or is it a case of correct long-term planning? Who can say? L. E. BAYNES.

Heston Airport.

PARAMEDICAL AID

Helicopters Better than Parachutes

THE parachute descents of well-equipped medical teams—including doctors, orderlies and nurses (*Flight*, October 14th)—have certainly been impressive and reflect great credit on all concerned; but surely the landing hazards usually existing at the inaccessible places where these teams are likely to be wanted would often rule out any proposed parachute drops. It would be bad enough having injured men in distress without the rescuers themselves becoming casualties!

On the other hand, properly equipped helicopters with trained crews could perform these duties more efficiently, if rather less spectacularly. One can easily visualize numerous situations—as at Gander not long ago—where the helicopter's exclusive abilities would be invaluable in locating the accident area, landing safely without difficulty and transporting the casualties direct to specialist treatment. R. G. HUGGETT.

Clifton, Bristol.

R.A.F.V.R. TRAINING

Need for Re-equipping with Modern Machines

ANNOUNCING the commencement of training of V.R. navigators and signallers in *Flight* of October 14th, 1948, you report that "it is planned to give 40 hours' refresher training to V.R. navigators and signallers . . . keeping reservists well practised on the latest radio navigational aids, morse operating, flight planning, and air plotting."

Surely this is a mistake! I should have thought it more in keeping with present V.R. policy to issue these men with T.R.9s and Bigsworth boards—or just a map and a ruler. Would not these be the instruments with which to inspire them with confidence, and to whip them up to the same standard of efficiency as the V.R. pilots achieve on Tiger Moths?

In all seriousness I think that this latest scheme puts fresh point on the ever-recurring complaint against V.R. "Tiger-bashing." Certainly the principles of flight remain true for a Tiger; but do not also the principles of signalling and navigation remain true for a T.R.9 and a Bigsworth board? The ridiculous anomaly should, however, be removed by a levelling-up process. Whether viewed from the standpoint of military efficiency, of stimulating recruiting, or now, as above, of simple logic, the necessity of equipping the V.R. with modern machines stands forth with challenging clarity. "JIMMY."

Glasgow.

FORTHCOMING EVENTS

Nov. 4th.—Sir John Cass Technical Institute: "The Aero Gas Turbine," W. Tipler, M.A.

Nov. 10th.—R.Ae.S. (Graduates and Students): "Flying Experiences," Lt. Cdr. (A) E. M. Brown, O.B.E., D.S.C., A.F.C., M.A., A.R.Ae.S., R.N.

Nov. 11th.—Royal Aeronautical Society: "French Aircraft Gas Turbines," M. Destival. (Read in English by M. Bidard.)

Nov. 12th.—Redditch Society: "Aircraft Photography," John Yoxall.

Nov. 15th.—Association of Auto-electrical Technicians: "The Electrical Starting of Aero Gas Turbine Engines," C. H. Barby, M.A.E.T.

Nov. 17th.—R.Ae.S. (Weybridge): "Some Aspects of Practical Flying," J. K. Quill, O.B.E., A.F.C.

Nov. 17th.—R.Ae.S. (Borough): "Civil Aviation," Peter G. Masefield, M.A., F.R.Ae.S.

Nov. 17th.—R.Ae.S. (Hatfield): "Design Problems of Large Flying Boats," H. Knowler, F.R.Ae.S.

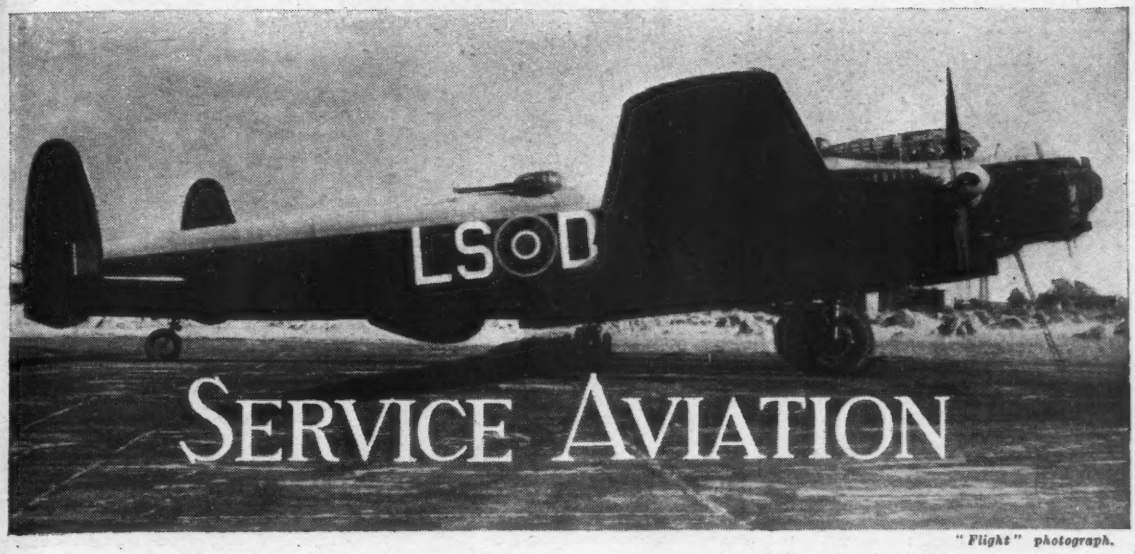
Nov. 17th.—R.Ae.S. (Preston): "Investigation of Aircraft Accidents," A. Cdre. Vernon Brown, C.B., O.B.E., F.R.Ae.S.

Nov. 17th.—Royal United Service Institution: "Jet Aircraft and their Possibilities," Dr. S. G. Hooker.

Nov. 19th.—Institute of Navigation: "Magnetic Compass Problems—A Fresh Approach," Dr. G. N. Harvey, O.B.E.

Nov. 20th.—Joint Meeting Royal Aeronautical Society and Helicopter Association of Gt. Britain. Full day Discussion on Helicopters.

Nov. 25th.—Royal Aeronautical Society: "Development of the Armstrong Siddeley Mamba Engine," W. H. Lindsey, M.A., A.F.R.Ae.S.



SERVICE AVIATION

"Flight" photograph.

STERLING WORTH: Significant squadron letters on an Avro Lincoln of No. 3 Group, based at Wyton.

R.A.F. Appointment

THE Air Ministry announces the appointment of A. Cdre. A. D. Davies, C.B.E., as Air Officer Commanding, Hong Kong. Since December, 1947, A. Cdre. Davies has served on the R.A.F. Manpower Economy Committee, as representative of the Air Council Members for Personnel, Supply and Organization.

New Navy Enlistment Schemes

YOUNG men between 16½ and 17½ with intentions of a Naval career may benefit from a recent Admiralty decision to accept an initial total of 1,000 volunteers in this age group. Entry has previously been restricted to those officially termed as "boys" (15-16), or "men" (17½ to 23); the new scheme provides for the admission of "youths." There are five trades in Naval Aviation open for enlistment under this system—aircraft mechanic, ordnanceman, photographer, aircraft handler, and meteorological observer. Ratings will become eligible for a man's rate of pay on reaching the age of 17½, with trade pay if qualified. Volunteers will be accepted on Special Service engagements, calling for approximately eight years service with the Fleet, and four with the Reserve. Full details of this scheme may be obtained from any recruiting officer.

The Admiralty has also announced that former officers of the R.N.V.R. who were employed on technical duties connected with radar, wireless, air radio, air electrical, or general electrical equipment, are offered five-year short-service commissions in the Royal Navy's Electrical Branch. Candidates, who must have completed one year's commissioned service, and be under 35, should apply to the Director of the Naval Electrical Department, Admiralty, Queen Anne's Mansions, S.W.1.

R.A.F. Essay Competition

THE Gordon Shephard Memorial Prize essay competition for serving members of the R.A.F. and W.A.A.F., which was suspended in 1939, is being reintroduced this year. Three referees appointed by the Air Council will judge the essays for the award of the prizes of £50, £35 and £20, which are provided from the income on a sum of money placed at the disposal of the Air Council at the end of the first World War by the late Sir Horatio Hale Shephard, in memory of his son, Brig.-Gen. G. S. Shephard, D.S.O., M.C.

The subject for the 1948/49 competition is as follows: "The increased speed and ceiling of modern aircraft and the introduction of new weapons and methods of defence are factors likely to affect all operations of an Air Force in any future war. Examine these factors and consider how they are likely to affect the operational employment of the R.A.F."

Many officers who later reached Air rank were prizewinners between 1918 and 1939, including Marshal of the R.A.F. Lord Douglas of Kirtleside, Air Chief Marshal Sir John Slessor, and Air Marshals Sir George Pirie and Sir Ralph Sorley. W/C. F. Gomersall, now serving at the Air Ministry, is the only individual to win prizes both as an N.C.O. and officer; in 1936, as a sergeant pilot, he won third prize, and two years later he won the second prize as a pilot officer.

Royal Air Force and Naval Aviation News and Announcements

Marshal of the Royal Air Force Lord Douglas of Kirtleside with Lady Douglas at the State opening of Parliament last week.

Remembrance Day

AIR MARSHAL SIR HUGH SAUNDERS, K.B.E., C.B., M.C., D.F.C., M.M., the Air Council Member for Personnel, will lay the R.A.F. wreath on the Cenotaph on Remembrance Day, November 7th. At the Westminster Abbey Service, the R.A.F. and Air Council will be represented by Air Marshal Sir George Pirie, K.B.E., C.B., M.C., D.F.C., Air Member for Supply and Organization. The Air Force contingent at the Cenotaph will consist of over 100 members of the R.A.F., W.A.A.F., and Princess Mary's R.A.F. Nursing Service. Outside London, R.A.F. stations will co-operate with civil authorities in local remembrance services.

Signals Switch

TWO Air Commodores in the R.A.F. Signals Branch have recently exchanged posts. A. Cdre. V. G. A. Hatcher has been appointed Chief Signals Officer at Fighter Command H.Q., a position previously held by A. Cdre. R. L. Phillips, who becomes the new

Service Aviation . . . . .

S.A.S.O. at the Headquarters of No. 90 Group.

Recruiting on the Road

TWO mobile R.A.F. recruiting teams set out on Nov. 1st to test volunteers in isolated districts of Scotland, Cornwall and Devon. Each team consists of two recruiting officers and two recruiting N.C.O.s, a medical officer and two medical orderlies, and two M.T. drivers for two 21ft long vans, one of which is used as an office, and the other as a medical inspection room. The teams are intended to bring the R.A.F. to areas not covered by the main recruiting organization, and are empowered to interview, test and medically examine volunteers, drafting suitable recruits directly to the R.A.F. training centre at Cardington, or in the case of the W.A.A.F., to Wilmslow. The main towns on the Scottish route are Wick, Dornock, Elgin and Granton-on-Spey; and those in the south are Bridgewater, Barnstaple, Okehampton, Camborne and Axminster. During their journeys, lasting 31 days, the teams will radiate from these larger towns to visit outlying districts.

Valetta Trainer

A TRAINING version of the Vickers Valetta transport—the T.1—has been designed for replacement of the Wellington conversions, still giving excellent service at operational training units.

O.K. for Sound

A YEAR'S survey by R.A.F. doctors of personnel working in various capacities on jet aircraft, has failed to reveal any obvious adverse effect on health or morale caused by the noise frequencies of turbojets. Periodic medical examinations were made of pilots, fitters, armourers, electricians and flight mechanics.

R.F.C. Reunion

A PROPOSAL for a reunion of former members of the R.F.C. (Naval and Military wings) was mentioned in *Flight* of October 14th. It is now announced that the reunion will also be open to those who served with the R.N.A.S. until the formation of the R.A.F. A small organizing committee has been formed, consisting of G/C. Tim Morice, Capt. J. C. C. Taylor, and Mr. Geoffrey Dorman, and it is intended to hold the reunion at Londonderry House early in the New Year in the form of a buffet/cocktail party. Those interested should write to G. Dorman, Sponson Developments, Ltd., 3, Albemarle Street, W.1.

Permanent Commissions

TECHNICAL BRANCH

Flying Officers: G. Bancroft, H. G. Cumpstey, L. S. W. Durston, F. T. Green, S. G. Hall, S. C. Kearn, E. C. McClelland-Hope, D. H. C. Munson, V. R. Murphy, M. O. Rayner, T. B. Stephenson, J. D. Storer. R. B. Stratton, N. E. A. Tabor.

SECRETARIAL BRANCH

Wing Commanders: E. G. Sewell, M. P. Thompson, P. J. Tungay.

Squadron Leaders: F. T. Bishop, S. F. Bonnet, R. Brice, J. W Chubb, J. F. Clayton, D.F.M. L. W. Farrow, O. F. Folkard, C. D Gillies, T. Gray, G. C. Hicks, P. J. Jordan, D.F.C., E. J. Midlane, G. G. Norval, C. F. Oliver, E. B. Panter, D.S.O., D.F.C., C. G. Pascoe, D.F.C., P. W. Peters, D.F.C., A.F.C., E. Quittenden, A.F.C., F. Q. Robertson, E. D. E. Rowe.

Flight Lieutenants: S. H. Braithwaite, R. P. Charter, B.E.M., J. Culliford, W. H. Cusson, J. P. Date, A. F. Derry, J. Dooley, J. H. Elshaw, A.F.C., D.F.M., W. G. Fell, J. Flynn, J. E. Fuller, H. T. Haggar, D.F.M., A. E. Hall, B. L. Harris, E. M. Harrison, N. T. Harvey, A. P. G. Holden, D. C. L. Kearns, W. Lemon, G. J. Lockwood, H. G. McCathie, W. E. McChesney, A. R. J. McVittie, E. Masterman, H. G. Matthews, D.F.M., D. G. A. Melrose, B. W. Mullen, F. D. Northfield, H. A. Penny, H. H. Pickard, A. Pitt, D.F.C., K. G. Pollard, D. V. T. Richards, M.B.E., F. T. Russell, H. J. Sadd, D. B. Saunders, K. Sayers, G. S. Sheffield, E. F. V. Sherwell, C. B. Simmons, A. M. Skene, R. E. Smart, A. B. Smith, B. R. R. Snape, T. Stafford, E. J. Stainer, F. D. Stead, G. A. McK. Stoner, L. Tait, D.F.M., V. W. Talbert, G. H. Taylor, H. A. Tester, L. V. Wallace, E T. Walter, R. C. J. Waters, P. Watson, D.F.C., G. T. Williams, O.B.E., D.F.M., J. R. Willis, W. M. G. Wing, D.F.M.

Flying Officers: J. G. Bailey, L. E. Bartlett, W. H. Bradbury, M. W. A. Dale, H. J. B. Edwards, D.F.M., A. Ellis, A. S. Gray, F. Hicks, G. K. A. Hollett, J. McK. Keogh, R. A. Kitchener, R. G. Neate, A. H. Norris, G. T. G. Richards. M. Scholes, M.B.E., D.F.M., D. G. Stafford, P. W. Stevens, A. E. Whichels.

EQUIPMENT BRANCH

Wing Commander: B. J. Bushe-Caryesford.

Squadron Leaders: W. E. Alton, S. R. W. Amor, R. C. S. Bevan, C. E. Bradley, P. P. Butler, M.B.E., K. S. Cooper, E. L. Cowan, W. K. Foote, W. A. Harris, K. J. Hattrick, J. G. Ireton, J. F. Keith, W. R. Maflan, J. Moore, M.B.E., A. H. Sloan, G. B. Thomas, D. Tollerton.

Flight Lieutenants: R. Adam, S. Baillie, G. W. Bennington, D.F.M., D. Brown, W. F. M. B. Buchan, N. R. K. Carr, E. Chelmick, K. B. Childs, R. A. Coleman, M.B.E., C. Davies, F. P. Duncan E. H. R. Falk, S. Foster, A. H. Gee, R. J. Jenkins, S. J. Leeder, H. R. G. Lidstone, J. Lynch, J. J. McCloskey, A. J. D. Mackintosh, W. Meekin, R. A. Milson, H. J. D. O'Connell, S E. Panton, F. C. Rodwell, M.B.E., E. H. W. Smith, J. P. A. Wade, D.F.C., S. W. Wilding, W. H. T. Woon, B.E.M.

Flying Officers: A. F. Baldwin, R. Davies, B. DeBurton M.B.E., D. R. Galliver, A. Gill, W. F. Langley, B.E.M., R. S. J. Prouse, C. W. Orriss, R. T. Smart, F. G. Tipping.

Pilot Officers: R. Cairns, R. G. Crane, G. R. Perkins, R J. Riley, H. W. Robinson, D. W. Tambling.

MEDICAL BRANCH

Squadron Leaders: P. H. Blackiston, M.R.C.S., L.R.C.P., D.A., S. E. Cupples, M.B., B.Ch., B.A.O., T. A. Evershed, M.B., B.Ch., M.R.C.S., L.R.C.P., H. N. H. Genese, M.R.C.S., L.R.C.P., J. B. Good, L.M.S.S.A., T. Gray, M.B., B.Ch., H. A. N. Hammersley, M.R.C.S., L.R.C.P., J. W. Reade, M.B., B.Ch., B.A.O., C. J. W. Soutar, M.B., B.S., L.M.S.S.A., W. G. Thompson, M.R.C.S., L.R.C.P., P. A. Wilkinson, M.R.C.S., L.R.C.P.

Flight Lieutenants: J. A. B. Hounsey, M.R.C.S., L.R.C.P. I. M. Perkins, M.R.C.S., L.R.C.P., M. Thomas, M.R.C.S., L.R.C.P.

THE GROVES MEMORIAL: The award of the L. G. Groves Memorial prizes was announced in "Flight" of Oct. 21st. Prizewinners and personalities at the recent presentation ceremony seen here are: Mrs. Groves, congratulating Dr. Frith of the R.A.E., and (l. to r.) Air Marshal Sir H. Saunders, Mr. P. G. White, Major Groves, and W/C. Horner.

"...AND THEY SAID YOU CAN GO EITHER INTO THE MINES OR THE R.A.F...."

Reunion

NO. 264 (Madras Presidency) Squadron are holding their Reunion on Saturday, November 27th, from 6 p.m. onwards, at Ye Olde Dr. Butler's Head, Mason Avenue, Coleman Street, E.C.2. Tickets 12s 6d from A. T. Figg, Totland Bay Hotel, Totland Bay, Isle of Wight.